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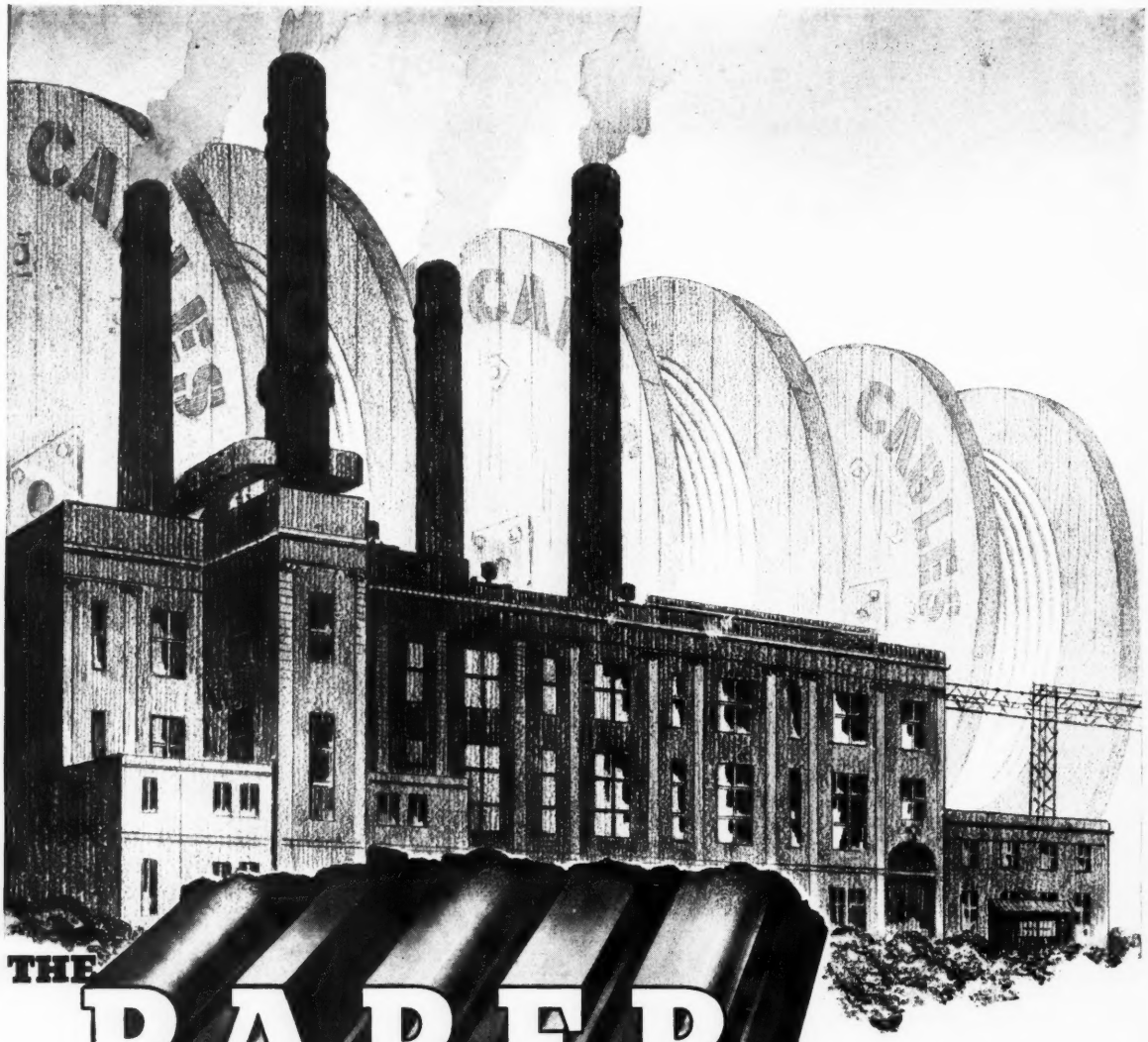

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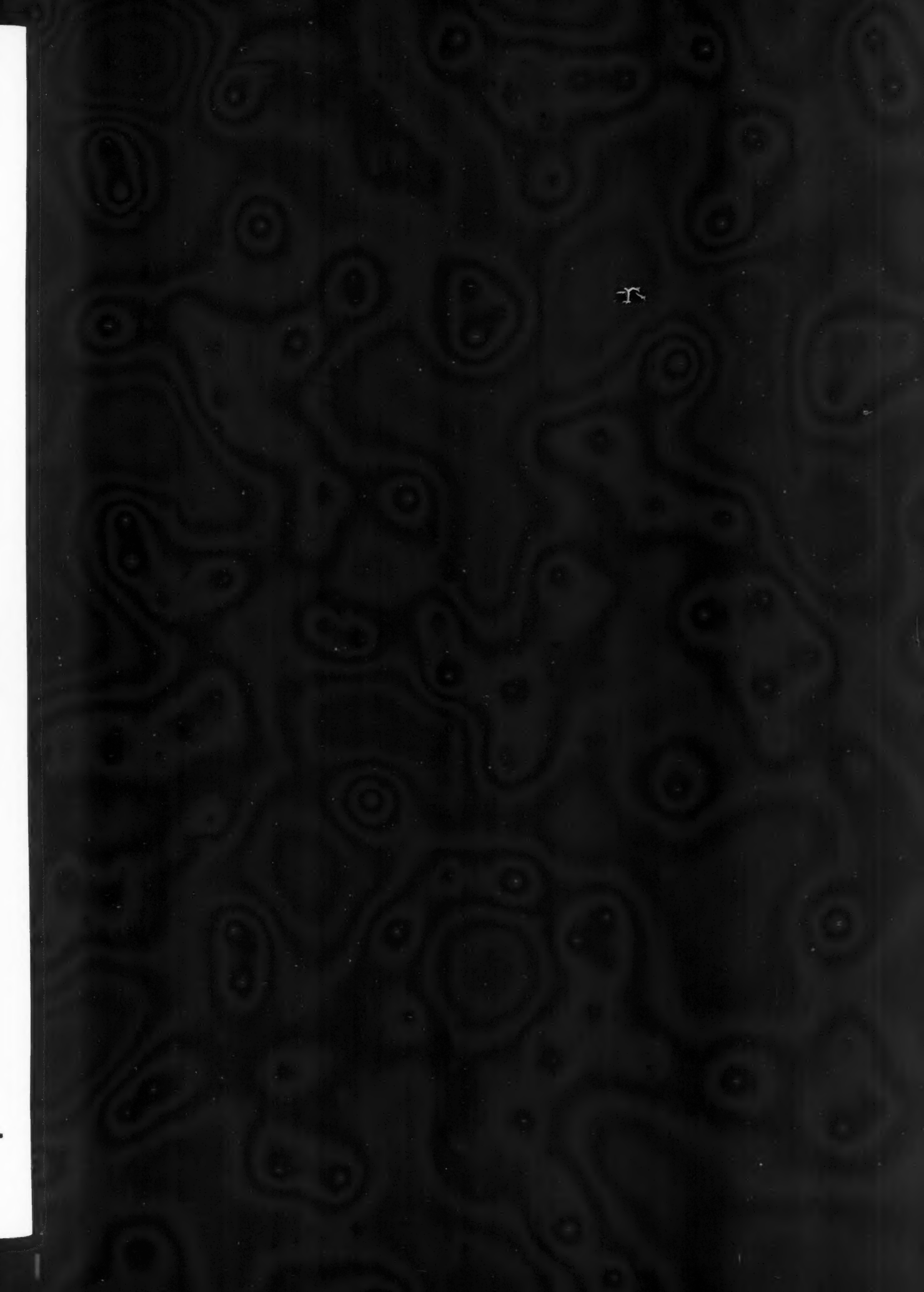

THE ELECTRICAL REVIEW

Volume CXXVIII **No. 3301**

Friday, February 28th, 1941

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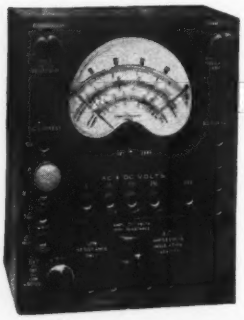

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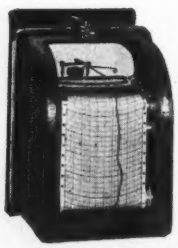

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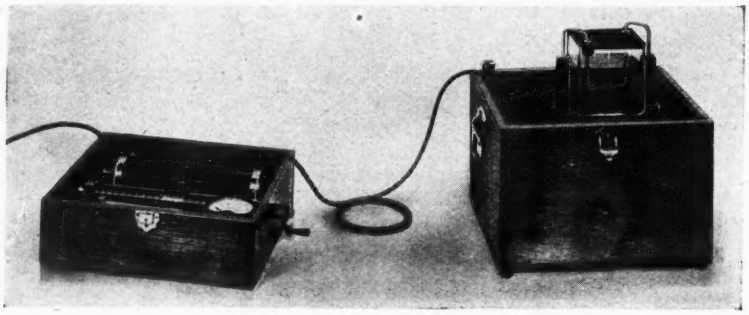

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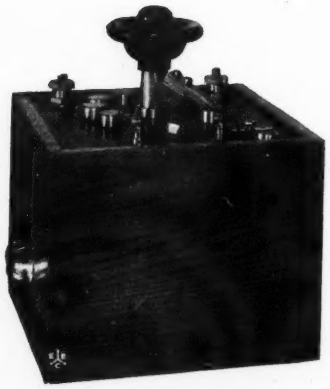

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THE
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THE OLDEST ELECTRICAL PAPER —— ESTABLISHED 1872

Vol. CXXVIII. No. 3301 FEBRUARY 28, 1941 Price SIXPENCE

Maintenance of Export Markets

Keeping an Eye on the Future

WHILE the principal immediate importance of our export trade lies in the necessity for obtaining as much foreign exchange as possible to help meet the cost of the war, there are other aspects of equal importance in the long run. One of these is the imperative need to maintain our overseas markets for the hoped-for post-war expansion of trade. Once lost to any rivals, these markets will be most difficult to regain—it may be a matter of years and we may never be able to recover them.

It is an accepted fact that once a customer has become accustomed to a particular make of equipment it takes a great deal to make him change over to something else. The suggested substitute may be cheaper or better—or even both—but he can never be sure of it and he prefers to adhere to the known rather than make what may be a costly experiment. This determination will probably be strengthened by the knowledge that he is getting good service from his present suppliers and moreover he possibly has stocks of spares for his existing equipment.

The difficulties and delays in the manufacture and shipment of goods stretch our customers' forbearance to the utmost limit, but there exists a goodwill which can stand a great deal of strain. We must be careful, however, that their patience is not overstressed or they will be forced to take steps to satisfy their requirements in other ways, either by turning to new suppliers or by making the equipment themselves.

Self-sufficiency

During the last war countries whose livelihood depended upon agriculture, stock raising and the production of raw materials made strong endeavours to become self-sufficient in a number of directions, thereby unbalancing world economy, not only to others', but also to their own detriment. The nature and tempo of this war has accentuated this tendency and we must strive to lessen the causes. We shall be able to do this only by devoting the whole of what effort can be spared from direct war production to the satisfaction of the needs of our overseas customers.

This time it has become necessary more than in 1914-18 for the Dominions to turn to the production of armaments and this has resulted in the establishment of all kinds of engineering and other works. Thus, when the war ends, we shall not only be saddled once more with a tremendous excess of productive plant and machinery ourselves, but we shall also have to contemplate a similar state of affairs in the Dominions. No doubt by that time we shall have become less dependent upon imports for our food supplies and to this extent we shall be able to redress the balance. But experience after the last war suggests that there will be an attempt to return to the "natural" state of things, in which Great Britain was pre-eminently a manufacturing country while the Dominions were primary producers.

The Trend in Australia

These thoughts are prompted by an editorial note in a recent issue of the *Electrical Engineer and Merchandiser*, of Melbourne. This refers to inquiries for Australian electrical goods from the Netherlands Indies, South Africa, India and Malaya which, at present, are difficult to meet owing to the need for raw materials for war work. It is suggested that as much of these as can be spared should be devoted to production for export. Regarding general trade, a manufacturers' representative recently said that Australian producers were in many ways better equipped to supply export demands than they were in the last war, although there were deficiencies in raw materials and shipping.

Generally it is made quite clear that Australia aims at developing an electrical export trade and thus, it would seem, not only require less electrical equipment from Great Britain but actually compete with her in external markets. Canada, of course, is already a strong rival in a number of directions, e.g., in the supply of domestic appliances to South Africa.

We do not question the right of the Dominions to develop in any direction in which they consider there is scope for them, but we feel that it is unfortunate for

Great Britain if they are to become competitors. It has been considered that the British Empire is a perfect economic unit, but this can only remain true if each member has recognised functions which must be complementary to, and not in conflict with, the interests of the others.

Thinking Ahead

IT is not improper, even at this time, as Sir Cyril Hurcomb remarked at the A.S.E.E. luncheon, to think of the prosperity and health of the electrical industry. That can surely be regarded as much the same thing as the good of the country as a whole. We hope with him that the spirit of co-operation now being manifested by supply engineers in so many ways may continue after hostilities have ceased. Some reorganisation of distribution will then, we believe, be necessary. Proposals already put forward to that end have not proved generally acceptable, but mere objections are not enough; a constructive plan must be put forward by the supply industry. No time should be lost in doing so after the war, Sir Cyril urged, and Mr. J. R. Beard's suggestion that electrical engineers should think about it now is good advice.

English Electric

MR. G. H. NELSON'S speech at last week's annual meeting of the English Electric Co., Ltd., contained two principal points. The first was a justification of the distribution as dividend of two-thirds of the profit earned upon the ordinary capital. He said that this would enable the shareholders to play the financial part in the war which was expected of them, but he might have mentioned to reinforce his argument that they are also entitled to some recompense for the many lean years which they experienced until comparatively recently. Mr. Nelson's second point was the inequity of the Excess Profits Tax. In this he is in accord with many other industrial leaders who consider that the damage done by the tax will not be compensated for by the revenue which it yields. There are signs that the next Budget may bring some relaxation of this rigid impost. The Federation of British Industries has suggested a reduction to 80 per cent., the balance to be devoted to non-dividend purposes or lent to the Government free of interest.

Trading Powers in Victoria

SOME consternation seems to have have developed in Victoria over the new Act which empowers the State Electricity Commission and other electricity supply authorities to trade in electrical apparatus and to carry out electrical installation work. Actually the powers bestowed on these bodies appear to be no greater than those already enjoyed by authorised undertakings in this country, which have still not succeeded in putting electrical dealers and contractors out of business. But in Clause 48 of the 1926 Electricity (Supply) Act which gave our undertakings trading powers there were certain safeguards which are not included in the Victorian Act. These confined the sale of "fittings" (to use the omnibus term for all kinds of electrical equipment) to consumers; they forbade the sale of fittings below the recognised retail prices (except to contractors); and provided that separate accounts should be kept for this side of the business and that the accounts should be balanced. Any questions which arose as to the recognised retail or trade prices were to be determined by a committee appointed for the purpose, comprising representatives of various branches of the electrical industry. This was the celebrated Committee "D" which strove valiantly but did not stay the course.

A Problem Solved

ELECTRICITY supply authorities have little to thank the war for. Any increase of load which it may have brought has been insufficient to meet the extra expenses in which they have been involved, and, of course, many undertakings have lost consumers without any form of compensation. There is one matter, however, which the war has settled in their favour. Electric cookers are long-lived appliances, and during the period of useful service of any particular example enterprising manufacturers continue to introduce improvements and new designs which make it appear *démodé* to its user. Accordingly, if she is merely hiring the cooker she takes the first opportunity of getting rid of it in favour of a more up-to-date model. Hence, what with returned cookers and others which remain in store the supply engineer has often been saddled with a burden which he has been puzzled to dispose of. The war has altered all that. Restrictions upon production have made new cookers somewhat scarce and so fashions do not count. So long as a cooker is able to cook its appearance is not important and it will not be long before the problem of the "black" cooker is a thing of the past.

Electrical Fire Spotting

SINCE the prevention of serious fires due to incendiary bombs largely depends upon instant action with local appliances, the adoption of automatic electrical means of giving warning in the earliest stage should materially reduce the risk. The most promising of these methods are discussed in the I.E.E. Memorandum reviewed in this issue, and a relevant British Standard Specification is also dealt with on the same page; further specifications for other types are to follow. Careful installation, maintenance and periodic testing are more than ever necessary, and in this respect, as the Memorandum suggests, closed-circuit systems offer an advantage. Such systems, however, take current continuously and a mains supply is therefore generally desirable. This entails the provision of batteries as stand-by should the supply fail at the critical moment. The nature of the precautions justifiable are obviously related to the value of the property protected or of that in its neighbourhood.

Fair Trading

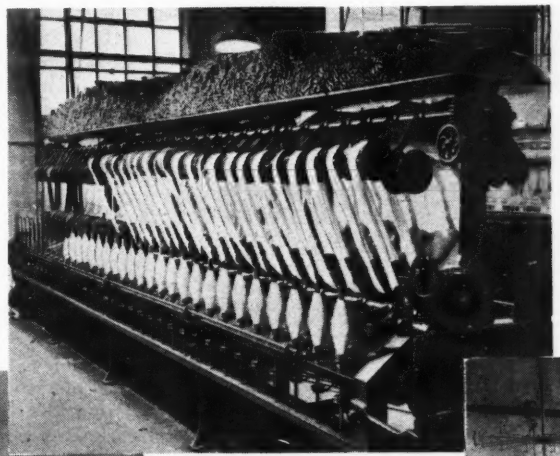
ALTHOUGH the war has interfered with the normal operations of the Fair Trading Council that body has found other useful avenues of service. From the report which is reviewed on another page it will be seen that the Limitation of Supplies Orders and the Purchase Tax have given the Council the opportunity of becoming a very valuable advisory body and the industry has much to thank it for in helping to smooth out the many difficulties and anomalies which inevitably arose in connection with the two measures. The Central Price Regulation Committee has also availed itself of the knowledge and experience of the Council in dealing with electrical goods. Three additions have been made to the Fair Trading Policy to square up matters which were not too clearly defined.

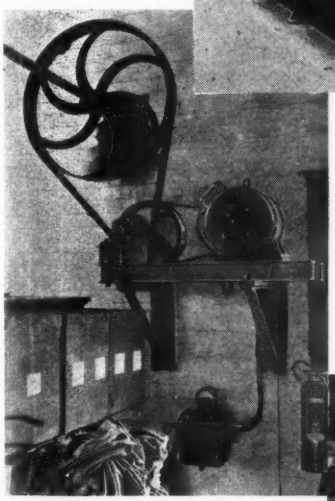
Knitted Garment Production

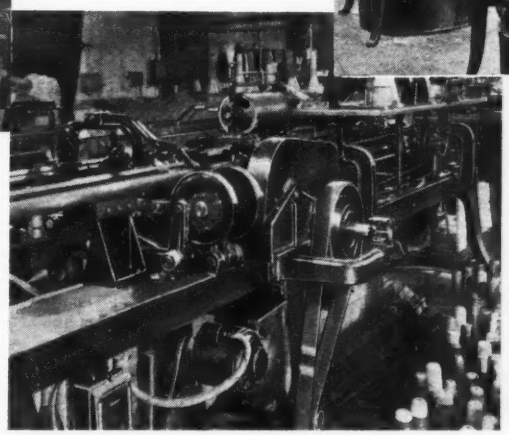
An Interesting Works Conversion

Solutions to problems brought about by the introduction of high-speed motors where low-speed engine drives had previously been employed form the principal theme of this article

AT the factory at Heanor of I. & R. Morley, Ltd., we recently saw, in addition to modern applications of the electric drive to the production of machine-knitted garments of all descriptions, how the majority of the existing machinery with a total of about 1,000 HP of driving equipment had presented some unusual problems when high-speed motors were introduced to replace comparatively low-speed drives associated with the original steam-engine group drives with which the factory was first equipped. Most of the original low-speed line shafts have been retained, the difficulties brought about by the introduction of the high-speed motor being overcome in most cases by double reduction short V-belt transmissions of which there are many outstanding examples throughout the installation.







The machines shown above rewind the yarn from hanks to bobbins. Left: Self-contained group driving and double reduction V-belt transmission unit for circular knitting machines. Right: Interlock knitting machines are outstanding instances of the double-reduction self-contained unit group driving. The flat knitting machine below exemplifies an interesting individual drive

As usual, the best way to convey an idea of the electrical applications and the problems associated with the conversion is to follow some of the essential processes through the factory from the receipt of the raw material to the dispatch of the finished products. In the form of cones, cops and hanks the raw material (spun yarn) is first received in the large basement store and a good deal of it requires re-winding on to bobbins before it is taken to the machines. On the simple winding machines the yarn is passed over a lubricant on a roll to facilitate operation on the machine needles. Many of these machines are individually driven by ½-HP motors with straightforward V-belt transmissions to the machine shafts, but in the case of one of the larger multiple-spindle machines a 5-HP motor in a cradle on the ceiling has a double V-belt transmission with an actual speed reduction ratio from 1,400 to 100 RPM. The basic material of a large portion of the factory's production is interlocked web which is produced continuously on the endless or circular-knitting principle, either on machines in which the bobbins or cones of yarn are mounted on stationary spindles above the revolving knitting machine proper, or on other machines in which this relationship between the stationary and moving parts of the mechanism is reversed.

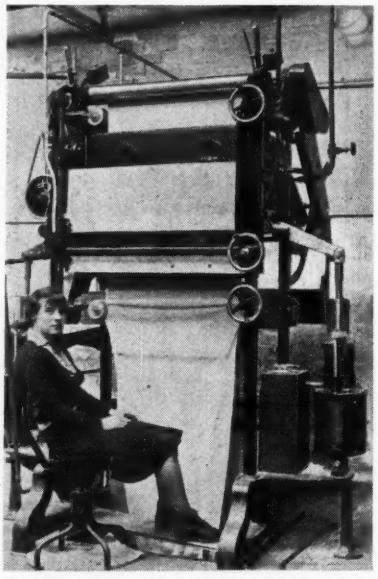
In both cases the yarn is fed up and down through guides to the needles and the actual knitting takes place by the interaction of the two sets of needles which is brought about by cam mechanism in the base of the machine. The circular web is collected in stationary or revolving tubs, according to the principle of production, underneath the machines.

In connection with both the stationary-spindle and revolving-spindle machines we saw some excellent group drives with self-contained neatly bracketed V-belt transmission equipments, each complete with the motor and countershaft for the double reduction. A typical drive employed in the factory is a 15-HP motor arranged to serve about a dozen machines, the motor and line shaft speeds, respectively, being 1,400 RPM and 110 RPM.

Machine flat knitting, which is in principle more like hand knitting, is done on machines in which the needles are stationary along a horizontal arm of the machine and the inter-operation of the needles is brought about by cam mechanism in a slide which runs over the needle bed. Colour selection is provided for in this case. The yarn from the bobbins or spindles on a table at the side of the machine is fed through various finger guides, while at the end of the machine is a sort of endless slat conveyor, the slats being equipped with holes by which the required fingers—and hence the colours—are selected. In principle this is rather like the operation of a piano player.

These machines are all individually driven, in each case a ½-HP motor being bracketed to the lower portion of the machine frame. A double belt transmission goes to a pulley on an endless chain to which is connected, by dog grips, the arm of the reciprocating sliding unit containing the needle-operating mechanism. The operation of every thread is governed by electrical stop motion gear, so that when a thread breaks it releases a catch which short-circuits a relay and, in turn, operates the sliding tackle mechanism.

Full-fashioned machines are rather similar in operation to the flat knitting machines, insofar as the operation of the needles is effected by the sliding cam mechanism arm, but there is also provision for increasing or decreasing, progressively with the production of the material, the number of stitches to effect the shaping of the garment. For instance, the leg of a pair of pants is made in one piece of a suitable shape, so that all that is required to complete it is a simple sewing operation. Here again we have another good example of group driving with a 15-HP motor serving about the same number of machines through overhead shafting; but first there is a self-contained double-reduction transmission gear, complete with the motor and counter pulley, nested neatly on roof girder work. The motor and line shafting speeds, respectively, are 1,400 and 80 RPM. Another machine on which we saw patterns produced by jacquards has its own 2-HP, 960-RPM driving motor with chain transmission working off a clutch to the machine shaft.



A feature of the "Bromac" web trimming machine is the electric thrustor which operates the press sections and works in conjunction with the web-propelling motor

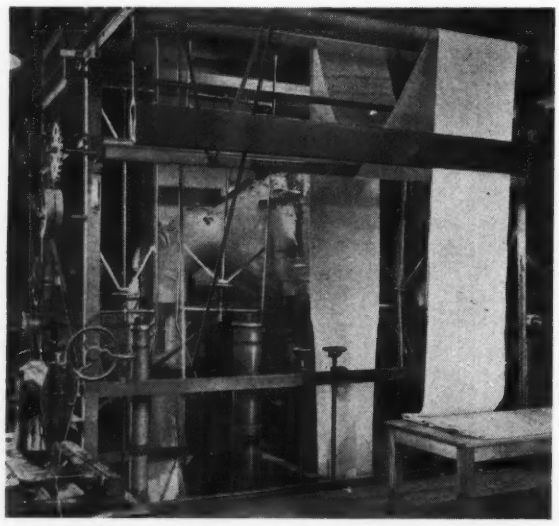
Many finishing and assembly operations of various descriptions are carried out on large numbers of bench sewing-type machines. Seaming is effected by running the edges of the garment between a pair of roller guides with teeth between which the sewing needles operate. Another machine puts welts on jumper sleeves, by a linking process effected by ratchet operation from the centre of a revolving element on which the garment stitches are threaded. A whole room containing about fifty of such machines, arranged in about six bench lines, is served by a 10-HP wall-mounted motor with the usual double-reduction V-belt transmission to a line shaft from which there is flat-belt transmission to the loose bench pulleys. The major speed reduction is again 1,400 to 100 RPM.

In another room in which various trimmings are applied to garments by bench-type sewing machines, each bench, with an average of about dozen machines, has its own "individual-group" drive from a 2-HP, 1,400-RPM motor under the bench at one end. In these cases there is a preliminary reduction by V-belt to 400 RPM at the common machine shaft, which runs centrally and lengthwise under the bench. For trimming the web a particularly interesting "Bromac" machine is used. As the web is drawn through a heated press by means of a 1-HP motor it is stopped at intervals when a B.T.H. electric thrustor pulls the two press sections together. The thrustor and the motor work in unison.

A somewhat fascinating process is the production of the woolly effect as a surface lining to the fabric. Essentially a "fluffing" machine consists of two sets of rolls both wound with wire; but on one set the wire is bent and on the other the wire is straight. During its passage through the rolls the fabric has the surface fluffed out by the combing operation of the bent wires. These straight and bent wire rolls are arranged round the periphery of a drum which revolves as a whole, but the alternate rolls are also driven independently in opposite directions by secondary transmissions, in some cases by gear wheels and in other by belt from the main drive. About 7 HP is required for each of these machines, but we saw an interesting group of three served by a 20-HP motor with a primary transmission on to a line shaft and secondary transmissions on to cone pulleys on the machines for speed variation.

It is well worth while watching sections of garments being cut out to template. Twelve thicknesses at a time are dealt with by portable cutters rather like self-contained electric bench saws, although the 4½-in. diameter blade in this case is not toothed. Each machine is equipped with a ¼-HP DC motor to avoid single-phase difficulties, the motor being mounted over the blade and having bevel and pinion transmission. There is a simple system of overhead sliding guide pulleys which carry the trailing cables to these machines, and in this way any one machine can deal with webbing up to 30 ft. long.

Of a variety of dyeing operations which we saw, that which interested us most is carried out in a machine with a horizontal perforated cylindrical garment container which revolves whilst partially immersed in the dye solution in



A drying-out machine in which hot air balloons out the travelling web

an outer housing. The container first makes a few turns in one direction, and then reverses automatically for a few turns in the other direction. There is chain and gear transmission to the drum shaft and the change of direction is effected by a simple change-over switch for the motor which is operated by a weight-controlled rocker on the end of the machine. It was surprising to see only a 1-HP motor driving this machine, but this will be better understood from the very large speed-reduction ratio from 1,440 RPM at the motor to only 30 RPM at the container.

Among various drying equipments there are centrifuges for first-stage drying. One of these has a 48-in. diameter container which is directly driven through a friction clutch by a 5-HP, 950-RPM motor. A large endless-conveyor type drying machine has two 10-HP fan motors which blow hot air through the drying chamber and a 2-HP motor serving the endless conveyor. We think, however, that the last word in drying operations is expressed by a drying-out machine in which hot air balloons the web out while this is travelling over rollers. A large fan in a pit below sucks in hot air from steam radiators and passes it through ducts into and out of perforated pillars over which the web is first placed. A 5-HP motor drives both the fan and the conveyor system, with chain transmission to the latter. Speed variation is effected by cone pulleys.

For transporting materials between the various departments of the factory many interesting large conveyors are to be seen. For instance, a conveyor used for transporting boxes of silk hose from the process room to the warehouse is 150 ft. long and is located below ground level. It is driven by two 2-HP motors operating in unison and with very high ratio speed reduction gearing. Where the principle of group driving is dispensed with throughout the factory it is usually on account of speed variation requirements, in connection with which the slip-ring motor does good service. Otherwise squirrel-cage motors are usually employed. The motors installed are of Laurence Scott, B.T.H., Brook, Higgs and Crompton Parkinson production.

The lighting in various departments is gradually being converted to the "Ediswan" fluorescent system. The 80-W fittings employed for this system are each 5 ft. long and they are arranged to give 25 ft.-candles at the working planes on the benches.

Major distribution of electricity supply throughout the factory is effected by a ring-main cable around the exterior of the building, and from this there are six tee-off feeds to power and lighting distribution boards. This ring main is fed from a substation in the basement where a supply at 11 kV is taken from the Derbyshire & Nottinghamshire Electric Power Co.

We are indebted to I. & R. Morley, Ltd. for permission to visit the works and to take photographs.

CORRESPONDENCE

Every letter must be accompanied by the writer's name and address preferably, but not necessarily, for publication. The Editors cannot accept responsibility for correspondents' opinions.

DC and AC Motors

TO your issue of January 31st, Mr. D. B. Hoseason, contributed a most interesting article on the increasing vogue of DC machines for many industrial applications. I fully agree with him that the DC motor, in spite of its higher cost as compared with the simple squirrel-cage induction motor, and even in spite of the handicap of conversion losses when operated from an AC supply, has many definite advantages when its use falls under the heading of adjustable speed, manipulative variable speed or co-ordinated speed control and that its scope is bound to increase as modern methods of manufacture require more and more processing mechanisms that demand quick response of speed and power from the driving element or elements.

I do not agree, however, that the invention of the AC squirrel-cage motor acted as a brake on the development of the DC motor. On the contrary, the greatest rate of progress in DC motor design coincided with the beginning of the vogue of the AC motor in the early years of this century. Undoubtedly, the scale became heavily weighted in favour of the AC motor because in the end the problem of generation, transmission and distribution was settled in favour of the AC system.

Nor do I think that the existence of the DC motor was ever seriously threatened during the years of expansion of the induction motor. Its merits were fully recognised in the sphere for which it is eminently suited and, if there is now a recorded increase in the demand for DC motors, it is because the sphere is getting larger and a more intelligent collaboration is being established between the machinery manufacturers and the electrical designers. In fact, its very existence alongside the cheap, efficient, reliable AC induction motor has had a distinctly harmful influence on the development of its potential rival, the variable-speed AC commutator motor. To use the author's own phraseology, I venture to say that it is quite possible that the exploitation of electric drive in industry would have been much further advanced if the DC motor had not been invented and engineers had been forced to develop the AC commutator motor to its full possibility.

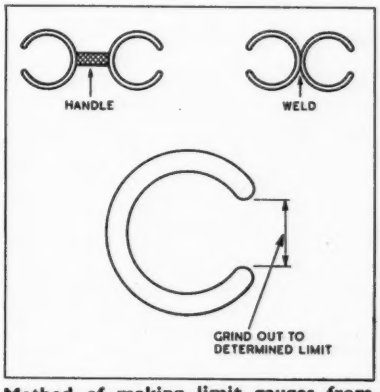
The AC variable-speed motor presented formidable difficulties and in consequence has had a laborious birth and slow development, because the problem of commutation, based on the experience obtained with DC machines, led designers astray, but during the last three or four years astounding rapid progress has been made and the rate of advance is accelerating. This relates in particular to the fixed-brushgear type of machine operating in connection with an induction regulator. In this type the problem of sparkless commutation has been solved in a manner that has rendered possible the construction of machines of very large output, small number of poles, wide speed range, high performance and great simplicity of control. Already a great number of such motors are in successful operation in all the fields in which the DC motor hitherto was unquestionably accepted as the ideal drive.

I do not wish to convey the idea that the AC commutator motor threatens the existence of the DC machine in the industrial field, but merely that it offers an alternative solution which, in case of the supply being AC, it will be increasingly worth while to investigate from the point of view of initial cost, performance, economy and suitability, and I venture to state that in many cases it will offer the best all-round solution. A healthy competition will thus be fostered, which no doubt will advance the technique of both types.

Norwich, *February 17th.* P. A. MOSSAY.

Cheap Limit Gauges

Perhaps some of your readers have had difficulty in getting gauge steel, but old ball races can be adapted as my sketch will show. They should be ground out to the desired dimension, and radiused; two races can be welded together to make a top and bottom limit combination, and they will last a very long time. I have had one of these in operation for many months on shaft grinding and found it very satisfactory; the steel of a ball bearing is always of high quality, as your readers will be aware.



Method of making limit gauges from old ball bearings

Bristol, *February 18th.* JAMES SCOTT.

Supplementary Relays

Devices Employed in Modern Protective Schemes

By C. L. Lipman, A.M.I.E.E.

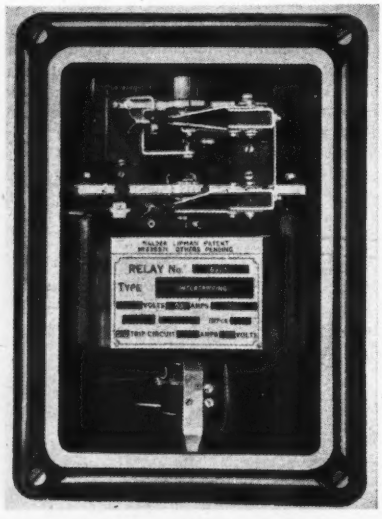
RECENT experiences have confirmed the wisdom of supplementing the main protective arrangements of important feeders with modern auxiliary devices, the purpose of which is either to augment the discriminating and selective characteristics of the protective system as a whole; or to ensure the tripping functions thereof and, at the same time, give effective notice at the appropriate centres of the occurrence of abnormal conditions.

A notable development is the employment of DC surge-proof intertripping relays at both ends of long feeders in conjunction with intertripping pilots. A typical system of protection of a 33/6.6KV transformer-feeder is illustrated diagrammatically below. Unit type protection is provided by one of the modern forms of balanced pilot protective relays in conjunction with two sets of Merz-Price current transformers and three-core pilot cable in the usual way.

Back-up protection is provided at both ends by triple-pole overcurrent and single-pole earth leakage inverse with definite-minimum time delay induction type relays working off separate groups of current transformers of suitable ratio of transformation. The power transformer is fitted with a Buchholz protector working in conjunction with a double pole flag indicator fitted with trip and alarm contacts and a transformer alarm relay fitted with alarm cancellation switch.

Intertripping System

The intertripping scheme comprises two DC surge-proof Nalder-Lipman intertripping relays, two intertripping pilot wires, two tripping relays of the hand-reset type and 30-V DC intertripping batteries. The surge-proof intertripping relay has been specially developed to overcome the difficulty of inadvertent operation as a result of interference by induced voltages under fault conditions from adjacent high voltage main cables, especially when the intertripping pilots are long. It is designed to be inoperative with any induced AC effect up to any value, while a slight time delay is provided to cover the possibility of DC transients. It operates in 0.2 second when excited with sustained DC from the intertripping battery and it also operates with DC superimposed on an AC component.



Nalder-Lipman DC surge-proof intertripping relay

The operating coil of the relay is designed to withstand a test at 4,000 V AC to earth. The relay (illustrated above) complies with the special requirements of the Central Electricity Board engineers.

For the sake of clearness the trip coils of the oil circuit breakers and the wiring of the trip (contact) circuits of the various relays are omitted from the diagram. The functional characteristics are indicated by the following schedule :—

Relay.	*Function.*
33kV overcurrent	Trips 33kV tripping relay.
33kV earth fault	Trips 33kV tripping relay.
33kV tripping	Trips 33kV O.C.B. and energises intertripping pilots.
33kV intertripping	Trips 33kV O.C.B.
33kV balanced pilot	Trips 33kV O.C.B.
6.6kV overcurrent	Trips 6.6kV O.C.B.
6.6kV balanced earth fault	Trips 6.6kV tripping relay.
6.6kV standby D.T earth fault	Trips 6.6kV tripping relay.
6.6kV tripping	Trips 6.6kV O.C.B. and energises intertripping pilots.
6.6kV intertripping	Trips 6.6kV O.C.B.
6.6kV balanced pilot	Trips 6.6kV O.C.B.
Buchholz surge paddle	Trips Buchholz surge flag.
Buchholz surge flag contacts	Trips 6.6kV tripping relay.
Buchholz gas float	Trips Buchholz gas flag.
Buchholz gas flag contacts	Energises audible alarm and lamp.
Check alarm	Cancels audible alarm.

The flag indicators combined with circuit opening and circuit closing contacts can also be arranged in three or four pole units with or without change-over links for sectional operation according to local requirements.

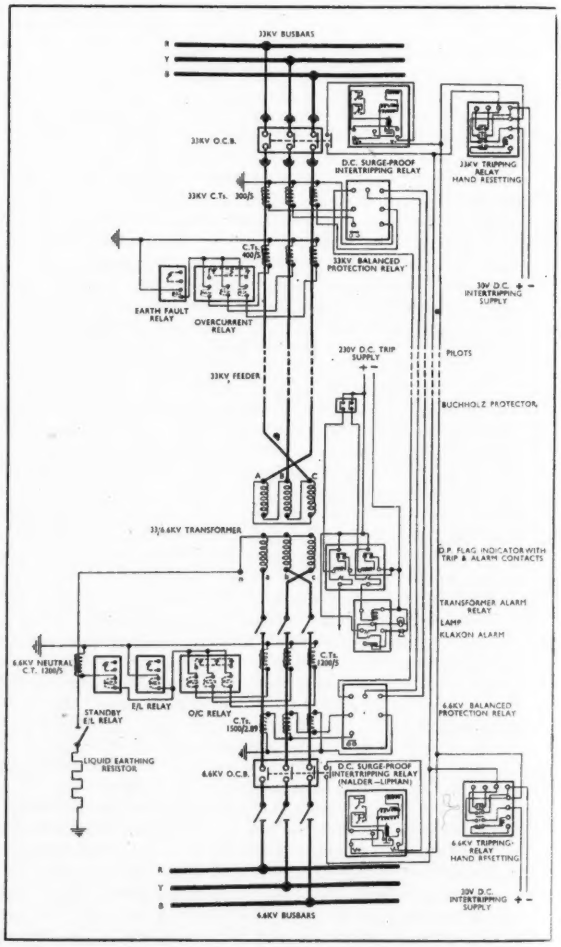


Diagram illustrating a protection scheme for 33/6·6 kV transformer feeder

PERSONAL and SOCIAL

News of Men and Women of the Industry

WE recently reported that **Mr. R. W. Grubb**, M.A., M.I.E.E., was to retire next month from the position of borough electrical engineer and manager at Dewsbury. Mr. Grubb has now sent us his portrait which we have pleasure in reproducing herewith. As mentioned in our last issue, he is being succeeded by **Mr. G. H. Sammons**, deputy engineer and manager at Blackburn.

Mr. R. W. Grubb

Lt.-Col. Lord Dudley Gordon has succeeded **Mr. D. A. Bremner** as chairman of the Refrigerating Machinery Export Group.

Mr. H. Muscroft, at present general manager and engineer of the Southend-on-Sea Corporation Passenger Transport Department, has been appointed general manager and engineer of the Huddersfield Corporation undertaking, in succession to Mr. H. C. Godsmark, who takes up duties at the end of March as manager of the Newcastle-on-Tyne passenger transport system. It will be some time before Mr. Muscroft is able to go to Huddersfield, as he will be required to give three months' notice at Southend.

Mr. A. E. Coombs, telephone manager in the Glasgow area, is to retire at the end of next month, having completed over forty years' service in the Post Office. He was due to retire some time ago, but decided to continue in his post until the change-over to the automatic telephone system in the city had been completed. Mr. Coombs was awarded the O.B.E. in 1935, and in November of that year was promoted to the new post of telephone manager at Glasgow, consequent upon the regional scheme of P.O. organisation. Before going to Scotland he served at Cardiff, Swansea, Bristol, and Liverpool.

The wedding took place on February 15th, at St. Michael's and All Angels' Church, Maidstone, of **Miss Betty Joan Kelly** and **Mr. C. Eric Stewart**, son of Mr. Charles Stewart, director of Johnson & Phillips, Ltd.

Mr. A. H. Owen, branch manager, Cryselco Ltd., 11, Albert Square, Manchester, has been appointed by the Electrical Industries Benevolent Association as honorary secretary of its Manchester and District Branch in succession to **Miss E. L. Wilson**, who has been honorary acting secretary since the death of her father, the late Mr. L. E. Wilson, who was secretary for many years.

Mr. and Mrs. Tom Callender's new address is The Garden Flat, Bidborough Court, Tunbridge Wells, Kent. (Telephone number unchanged.)

Mr. W. A. Stanier, chief mechanical engineer of the London, Midland and Scottish Railway, has been elected president of the Institution of Mechanical Engineers.

Mr. S. C. Riggott, chemist and combustion engineer, Norwich, has been recommended by the Cardiff Corporation Electricity Committee, for the appointment of combustion engineer at Roath power station at a salary of £402 per annum. Mr. Riggott was educated at Derby and Nottingham University and received his training at Derby with the London, Midland & Scottish Railway Co. The Committee has also recommended the appointment of **Mr. C. Gardiner** as chemist of coal, water, &c., at a salary of £296. Mr. Gardiner is at present assistant chemist with the Northmet Power Co.

Mr. J. Pascoe, deputy chairman of British Timken, Ltd., has been appointed deputy chairman of Fischer Bearings Co., Ltd.

The services of **Mr. A. G. Cooper**, electrical engineer at Thornton Cleveleys, have been extended until March 31st, 1942.

Mr. J. Van Dyk, manager of the Philora Division of Philips Lamps (A/asia) Pty. Ltd., Sydney, has been elected president for 1940-41 of the Illuminating Engineering Society of Australia (New South Wales Section), and **Mr. A. C. Pearse**, illuminating engineer and departmental manager of the British General Electric Co. Pty., Ltd., Melbourne, has been elected president for 1940-41 of the Victorian Section of the Society.

Obituary

Mr. Albert Hall, whose death on February 11th we briefly reported in our last issue, died as the result of a road accident. Born at Portsmouth in 1878, he entered the Naval Dockyard as an apprentice at the age of fifteen. He gained a Whitworth Exhibition and went to the Royal College of Science to study under Professor John Perry. When the late Dr. S. Z. de Ferranti wanted a personal assistant Prof. Perry recommended Mr. Hall, and thus began an association of nearly thirty years as personal technical assistant to Dr. Ferranti. For twelve years Mr. Hall worked on Dr. Ferranti's development of the internal combustion engine and assisted in the development of progressive feed-heating and re-superheating, and in the design of Ferranti's multi-disc self-lubricating thrust which was patented in 1910. In 1915 Dr. Ferranti released Mr. Hall to enter the service of the Ministry of Munitions.

The late Mr. A. Hall

In 1919 he returned to Dr. Ferranti, but, in a consulting capacity, continued as technical adviser to the British Mannesmann Tube Co. When Dr. Ferranti became interested in radio in 1922, Mr. Hall turned from heavy engineering to radio experiment, on which he concentrated for the remainder of his life, becoming chief engineer to the Radio Department of Ferranti, Ltd. In 1931 he was responsible for the design of a commercial super-heterodyne receiver and he contributed much to the perfection of the moving coil loud speaker. With the advent of "talkies" he became interested in amplifiers for public address and the equipment of several theatres includes amplifiers of his design from the photo electric cell to the loud speaker. Some years ago he published "The True Road to Radio," which was widely read by radio amateur constructors.

The funeral took place at Woodford, Cheshire, on February 15th, and was attended by Mr. and Mrs. Vincent de Ferranti, with representative members of the management and staff of Ferranti, Ltd.

Mr. G. Newbigging, one of Mr. Hall's assistants, was also killed as a result of the accident, while Mr. A. Billings, another assistant, who was in the car, received severe head injuries.

Mr. S. D. Jones.—The death occurred on February 16th of Mr. S. Derwen Jones, who was borough electrical engineer of Batley until his retirement in 1931. He was in his 75th year. Mr. Jones was educated in Manchester and attended Manchester Technical College. He served as a demonstrator at Manchester Technical School and as shift engineer with Salford Corporation Electricity Department. After being assistant engineer of the Bristol Tramways he became chief assistant electrical engineer at Doncaster, going to Batley in 1902.

He was a member of the I.E.E. and an associate member of the Institution of Mechanical Engineers. In 1925 he was chairman of the North Midland Centre of the I.E.E. and for three years acted as hon. secretary of the then Yorkshire Centre of the I.M.E.A.

Mr. Percy Loosemoore, for seventeen years a member of Callender's Cable and Construction Co.'s London sales staff died recently after a long illness. His whole business life of thirty-two years was spent in the company's service.

Mr. John Hardie, M.B.E., Glasgow, whose death occurred on February 13th, was a pioneer in Scottish telephone development. He served for over forty years in the engineering department of the Post Office and retired in 1929 from the position of assistant superintendent engineer of the western district of Scotland. In 1914 he performed valuable work in connection with the establishment of communication services in the west of Scotland and was awarded the M.B.E.

While in London on special duties Mr. Hardie supervised underground constructional work prompted by a Parliamentary inquiry and subsequently took charge of the Mayfair district, being responsible in that capacity for telephone and telegraph services at Buckingham Palace, Westminster Abbey, and the West End in connection with the Coronation of King Edward VII.

Mr. A. S. Hampton.—The death occurred in Glasgow on February 14th of **Mr. Alfred Smith Hampton**, former divisional electrical and signals superintendent of the London, Midland and Scottish Railway Company. Mr. Hampton trained as a draughtsman at the Royal Technical College, Glasgow, and entered the employment of the old Caledonian Railway Company, ultimately rising to the position of chief assistant to the telegraph engineer. On the grouping of the railways he was appointed divisional electrical engineer in Scotland, and in 1929 became divisional electrical and signals superintendent. Mr. Hampton was chairman of the Scottish Centre of the Institution of Electrical Engineers in 1922, and he was also a prominent member of the Institute of Transport and of the Institution of Railway Signal Engineers.

Mr. K. Fraser.—The death occurred at his home in Leeds on February 17th of Mr. Kenneth Fraser, vice-chairman and managing director of the Yorkshire Copper Works, Ltd.

Mr. E. A. Marx, who joined the London office of Siemens Electric Lamps & Supplies, Ltd., in 1926, and was appointed manager of the company's Leeds branch in 1931, died last week-end.

Detecting Incendiary Bombs

I.E.E. Report and Standard Specifications

A MEMORANDUM entitled "Fire-Detection Devices with special reference to the Detection of Incendiary Bombs" has been prepared by the I.E.E. Advisory Committee to the Ministry of Home Security (6d. from the Institution). Main consideration is given to the 1 kg. magnesium bomb, which has a light output of about 6,000 c.p. and a heat output of about 15,000 BThU.

Impact of an incendiary bomb can be detected, as in one example, by a hemp net held under the roof on springs. Cords attached to the net at 12-ft. intervals terminate in metal rings which are passed through metal eyes screwed in the wall, depression of the net causing the rings and eyes to make contact and close an electric bell circuit. In another instance the electric circuit is made by the bomb causing two layers of wire netting to touch. The impact of a 1-kg. bomb on a roof is about 4,200 ft.-lb., but after penetration it may exert only a small force on any lower obstruction. Such devices, therefore, have to operate within wide limits of impact energy and have the disadvantage or requiring materials that are needed for other war purposes.

Detectors indicating light or fire can often be made to operate fire-extinguishing devices as well as signals. Characteristic curves of three types of light-sensitive cell are reproduced. In one system employing selenium resistance (photo-conducting) cells in conjunction with an amplifier and relay, a sudden increase in illumination of 0.5 foot-candle from darkness would theoretically, if unobstructed, operate the device 100 ft. away. A supply of electricity is required for the amplifying unit to function.

Photo-electric (photo-emissive) cells of the gas-filled type can be used to work relays, which are available commercially to function at 0.2 ft.-candle corresponding to the illumination due to 6,000 c.p. at 173 ft. These cells may be either mains operated, AC or DC, or battery operated. The voltage required for the anode of the cell is usually less than 100. One make is claimed to sound an alarm on the ignition of an incendiary bomb 300 ft. away, but this high sensitivity may limit its use. Protection is needed during bright daylight and darkness.

No system based on a third possibility, the use of rectifier (photo-voltaic) cells, appears to have gone beyond the experimental stage. Such cells require no applied potential and will give microammeter readings proportional to the incident illumination; the current generated is related to the value of the external resistance.

Thermally-operated Types

Most fire detectors depend upon the action of thermostats when a predetermined temperature has been reached (simple expansion) or else when a sudden rise in temperature occurs (differential expansion). Most of the first kind operate fire extinguishers and the predetermined temperature is therefore high, e.g., from 135 to 155 deg. F. In the second class the thermostat is generally set for a sudden rise of 30 deg. F.

Systems based on the melting of metals include one employing units wired in parallel, each consisting of spring contacts held apart by wax; on the melting of the wax contact is made and an alarm sounded. Another type comprises a plunger fixed in a ferrule by means of a fusible alloy, the composition of which varies with the temperature in view; this is generally used as a hold-off device to actuate fire extinguishers. A detector which relies on the radiant heat from a bomb is in course of development.

A combination of fusion and impact provides the basis of a method in which several wires partly of double-cotton-covered copper and partly of fusible tin are run in parallel; destruction of any of them gives a warning. Thermostats (usually set for 160 deg. F.) can be inserted to give a larger temperature range. A flame (ignition) detector has been devised in which a paper strip incorporates a narrow metallic strip of low melting point in circuit with a dry cell; the burning of the strip causes a relay to sound an alarm. A large amount of strip would appear to be necessary to give an early signal.

Smoke detectors, though sensitive in indicating minute quantities of smoke, are expensive to install. In some, the atmosphere in a protected space is continuously sampled by being drawn through small-bore tubing into a centralised cabinet; a beam of light, deflected or dimmed by the smoke particles, gives an alarm through a photo-electric cell. The time required by the smoke to reach the central cabinet may be an adverse factor in certain circumstances. In other systems the photo-electric cell and optical system are contained within the protected space. Dust due to the explosion of a near-by high-explosive bomb might cause a false alarm.

A further class of incendiary bomb detector, which is based upon comparison between the conductivity of the ambient atmosphere and that of a known gas, is understood to be in commercial development on the Continent. The apparatus consists of two cylinders, each with a central electrode and having the internal surface coated with a radio-active salt. One cylinder is sealed and contains a known gas, whereas the other is open and through it is drawn the gas under observation. Any variation in the molecular change or ionisation of this gas will alter the electrical characteristics which are shown by means of a valve that amplifies minute changes in current. Stability and sensitivity are obtained by working on the negative part of the plate characteristic.

Specification for Detectors

A British Standard Specification, BS/ARP 53, for the detection of incendiary-bomb fires by heat-sensitive devices has now been issued (4d. post free, British Standards Institution). Three forms are recognised. In the first, an electric bell or relay circuit is closed when the rate of rise of temperature exceeds a predetermined limit and when a predetermined temperature is reached. Detectors of the second type operate only when a predetermined temperature is reached, independent of the rate of rise, *e.g.*, by simple thermostats or by contact of two elements due to the melting of an alloy or the expansion of a liquid. In the third type, the melting of an alloy interrupts a closed circuit.

All heat-sensitive units must be of the self-resetting kind or capable of being reset by hand or easily replaceable. No goods should be placed within 2 ft. of any unit and each section of a room, as well as separate rooms, should be individually protected. The first two types must be provided with a switch for closing the circuit so as to test the whole of the wiring. A switch for opening the circuit is called for in the third case and the alarm must function in the event of interruptions of the current from any cause. It is preferable to wire the units in a ring main, looping in where necessary and avoiding joints. The alarm must be battery operated and give a continuous audible signal; if actuated through a relay, the latter should be in close proximity to it. All wiring should be protected where possible against mechanical damage. Batteries (wet- or dry-Leclanché or secondary-cell in a locked case) should give not less than 6 V and be capable of operating the alarm continuously for 15 minutes.

Forced Circulation Boiler

A 25,000-kW superposed turbo-alternator ordered for the generating station of the Montaup Electric Co. at Somerset, Mass., will, *Power* states, be supplied with steam from the first forced-circulation boiler to be installed by a public supply undertaking in the United States. Steam conditions at the boiler stop valve will be 2,000 lb. per sq. in. and 950 deg. F. The turbine initial pressure will be 1,800 lb. and the machine will exhaust at 400 lb. per sq. in. through flue-gas reheaters into the present station headers. Feed water at 2,100 lb. for the La Monte boiler will be provided by two 3,600-RPM turbine-driven multi-stage pumps, each carrying half the load, or 325,000 lb. per hr., requiring 1,050 HP. In the event of failure of one unit the other will deliver the full flow at 4,000 RPM and 2,200 HP. About 70 per cent. Rankine efficiency was required of the pumps, three of which are to be installed on the turbine floor level. It is anticipated that the present performance at high load factor of 14,350 BThU per kWh will be improved to 10,500 BTh.U.

Moisture and Salinity

Conveniently Rapid Means of Electrical Measurement

By T. Thorne Baker

THE amount of moisture present in materials used in industry is capable of exerting a highly important influence on their properties and utility. Moisture in the atmosphere, estimated ordinarily by means of wet and dry bulb thermometers, or by a direct-reading instrument such as a hair or paper hygrometer, can be measured quickly and conveniently by electrical means. But its determination in the case of solid materials presents more difficulty than air, and if done in the laboratory needs time to drive off the moisture under conditions which will not affect the specimen or sample. Electrical methods, apart from providing a direct and rapid means of estimation in solids, liquids, or in the atmosphere, possess the added advantage that the indicating instrument may be remote from the test point and may also be of extremely small dimensions.

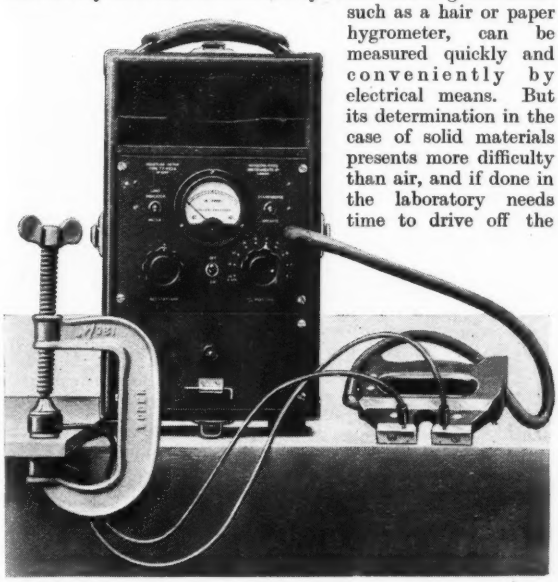


Fig. 1.—Marconi-Ekco humidity meter with needle electrodes (right) and alternative clamp electrode (left) for thin specimens

The amount of moisture present in commercial materials often reaches a high figure. One may take the examples of English oak, which may contain between 7 and 23 per cent. of water and maple wood, between 7 and 18½ per cent. Gelatin in the "dry" state will contain as much as 16 per cent. of water. A litre of air saturated with moisture at normal temperature will contain 0.0128 gramme of water; at summer temperature, say, 86 deg. F., it will contain 0.030 gramme.

One example of the electrical method is the drought meter devised recently by Shaw and Baver of the Ohio State University. This consists essentially of a coil of copper wire wound on a glass tube, which is merely placed in the soil, and a current passed through it. The resistance measured gives the required information; the drier the soil, the greater the resistance. This simple hygrometer is stated to be both accurate and quick in response, and has proved of considerable value in estimating the progress of drought conditions.

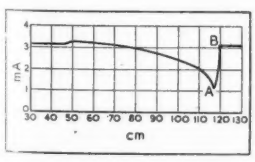


Fig. 3.—Typical capacity current curve illustrating sudden rise

Another new type of electrical hygrometer has been developed in the United States Bureau of Standards Radio Section by F. W. Dunmore. It is both rapid in response to changes in humidity and will function well at low temperatures. It consists of two spirals of fine palladium wire wound 1/64 in. apart on a light aluminium tube insulated with a coating of polystyrene resin; the turns are 1/20 in. apart. Over the parallel wound spirals is a thin film of partially hydrolysed polyvinyl acetate with which a small quantity of lithium chloride has been mixed; the lithium salt absorbs moisture very rapidly, and the complete film has the property of taking up or giving off water very readily. Any change in humidity in the air will affect the electrical resistance of the film between the two spirals and can be made to operate a direct-reading ohmmeter with a scale calibrated to indicate the percentage relative humidity.

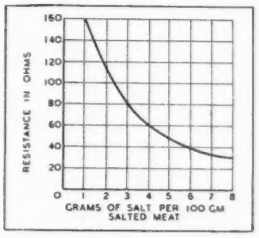


Fig. 4.—Graph relating salt content in pork to its electrical resistance

Hygrometers of this type can be made of different sensitivity ranges by varying the amount of lithium chloride in the film. If a number of them be connected in parallel, each with an appropriate resistor in series, an instrument can be made covering from 10 to 100 per cent. relative humidity with great accuracy.

A meter specially designed for gauging the moisture in timber is made by Marconi-Ekco Instruments, Ltd., measuring 10¼ by 10 by 17 in. and weighing 24 lb. It gives readings in percentage moisture over a range of 7 to 24 per cent. The resistance of the wood fibres between two pairs of needle points is measured by adjusting a potentiometer in the grid circuit of a valve voltmeter, so as to obtain a standard deflection on the anode meter.

The electrode needles leave only small marks when pressed into the wood surface, so that the object tested is not in any way damaged. They are pushed into the wood by the holder to which they are attached, and the potentiometer resistors selected by rotating a switch which is calibrated directly in percentage moisture. When testing veneers or thin wood specimens the alternative clamp type electrode seen in the illustration (fig. 1) is used. An alternative method of test is offered by means of a relay switched into the meter circuit, which operates a lamp fitted in the handle if the moisture exceeds a pre-set value.

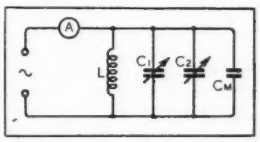


Fig. 2.—Henriquez circuit for determination of dielectric constant

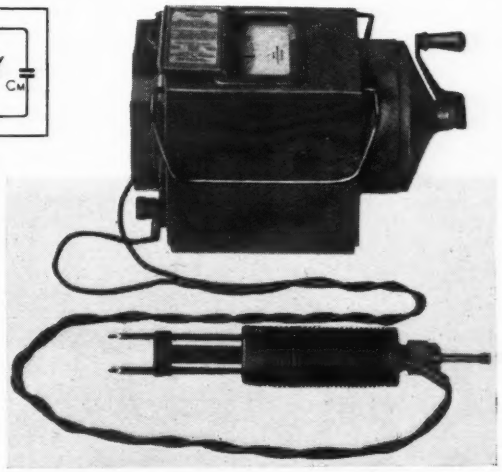


Fig. 5.—"Meg" meat salinity tester with stainless steel probe electrode and penetration gauge

Moisture gradients can be determined rapidly by sawing off a piece of wood and testing the end at different points on the cross section. It is claimed that kiln production can be considerably increased by pulling the wood earlier when practically

all stock has reached the proper condition, and that by keeping a check on the moisture in wood in storage yards attacks by fungus can be largely prevented.

An elegant method for the estimation of water in small specimens of tea, tobacco, flour, artificial silk, butter, oil, etc., has been devised by Dr. P. C. Henriquez, by measuring their dielectric constants. Water in hydrocarbons can be estimated in this way with an accuracy of 0.01 per cent. The material to be tested is placed in a small measuring cell of an average volume of 15 c.c., represented by C_m in fig. 2. It is connected in series with a milliammeter A and L is a fixed self inductance, C_1 and C_2 being two variable condensers. The capacity is measured in a high-frequency oscillating circuit which is in resonance with a quartz crystal, and if ϵ be the dielectric constant, C the capacity of the measuring cell when filled with the substance to be measured and C_m its capacity empty, then $C_\epsilon = C_m$.

When the capacity in the anode circuit is increased the plate current falls at first slowly, then more rapidly, up to the minimum point A (fig. 3); a very small rise in capacity then causes an upward jump in the plate current. When making the measurement, the milliammeter is adjusted to some point between A and B (fig. 3) and the fine adjustment condenser C_2 is read; C_1 is for preliminary coarse adjustment. The cell is now filled with the sample, and C_2 is again adjusted until the meter reading returns to the same point. The difference in capacity thus found, divided by the capacity of the empty cell, gives the dielectric constant – 1. When routine determinations have to be made, a curve can be prepared giving the relation between moisture content and condenser readings.

The milliammeter, two variable condenser dials and adjusting knobs, are mounted in the top of a very compact rectangular case containing the various parts. The method has useful applications to such substances as ether, anilin, benzol and petroleum. This instrument is made by Kipp & Zonen of Delft, and the sole agents are W. Edwards & Co., London.

A problem somewhat similar to those already discussed is the measurement of salinity in meat, for which purpose an instrument of the familiar "Megger" type has been evolved by Evershed and Vignoles, Ltd., in collaboration with the British Food Manufacturers' Research Association. The relation between the salt content of salted pork and its electrical resistance is seen in fig. 4 (F. H. Banfield, Journal, Soc. Chem. Ind., Dec. 13th, 1935). The purpose of the instrument is the measurement of the salinity of cured pork with a view to ascertaining if the cure is complete, and to measure the rate at which the salt used in curing penetrates into the meat. The electrical resistance of the muscular tissue of fresh pork is greater in a very fat than in a lean side, and is greatest near the shoulder and least in the hind leg, and incidentally varies if measured along or across the fibres.

The "Meg" salinity tester measures essentially the resistance of the meat at different depths; owing to its small water content the concentration of salt in fat is also very small, but rises as the measurement is made through the fat into the lean. The resistance will naturally depend on the total of inorganic salts present, and in making tests of cured meat it is necessary to make a correction for the ratio of saltpetre to sodium chloride (common salt). Thus, assuming that nitre and salt penetrate at the same rate, if the nitre in the original pickle were 10 per cent. of the salt, a reading on the tester of, say, 5 per cent. would require correcting to 4½ per cent. for sodium chloride.

The tester consists of two parts. One is a handle-driven AC generator, which is combined with an ohmmeter in a neat cast aluminium case, which weighs 8¼ lb., and measures 9½ by 5½ by 6¼ in. The tester, with a range of 1 per cent. to 10 per cent. salinity, and temperature scales of 5, 10 and 15 deg. C., is packed in a leather case, which, with the probes and leads weighs 12¼ lb. The other part is the probe, which is provided with two sharpened prongs of stainless steel, inside each of which is an insulated electrode, as seen in fig. 5. A spring-urged stop slides over the prongs, the depth of insertion being indicated on a scale between the two. A pair of leads connects the probe with the tester.

After inserting the probe into the meat to the required depth, the generator handle is turned at a speed at which the clutch is felt to slip, and the reading on the ohmmeter is taken. The deflection of the ohmmeter movement, which depends on the ratio of currents in the current and potential coils, gives the resistance directly. A rotary convertor and rectifier enable AC to be used in the testing circuit, thus eliminating any electrolytic action at the electrodes.

Milk Marketing Board Headquarters

THE headquarters of the Milk Marketing Board are situated in rural surroundings on a 17-acre site, and the building was planned by Mr. K. S. Layton, M.Inst.R.A. Electrical services are used for a wide variety of requirements, and the normal demand is 450 kW. The supply is taken from the mains of the London and Home Counties J.E.A. at a pressure of 400/230 V, and is controlled by a substation on the south side of the Board's premises, the main switchroom controlling two secondary switchrooms. From these sub-main switchrooms cables are run underfloor in steel ducting to various distribution boards. A secondary steel trunking system accommodates cables for fire alarms, telephones, clocks, and intercommunication bell services.

The wiring is carried out in "Silverlac" conduit except in exposed and damp situations, where galvanised conduit is utilised. Ironclad distribution boards are installed of a capacity sufficient to enable additional loading to be added should extensions of the system be necessary. Provision has been made to change over in certain departments from AC to DC or vice-versa, at short notice should emergency demand it. Altogether 75,000 yards of cable have been installed. As the partitions are of metal special switch boxes and switches have been designed. All the switches are of the silent "Landor" pattern.

The lighting is designed to give ample illumination, the larger departments having enclosed spherical fittings in bronze and the smaller offices pendants.

Main entrance hall with panel pendants and illuminated cornice

There are special lighting features in the entrance hall, the corridors, the boardroom, the cafeteria, the executive dining room and certain executive offices, fluorescent tubing being used for the cafeteria and entrance hall. These lighting fixtures and fittings were supplied by the General Electric Co., Ltd., and their installation was carried out by J. E. Swan & Co., Ltd.

Intercommunication throughout the building has been provided by a G.E.C. private automatic telephone system, comprising a 150/200-line exchange. This is so designed that, if through enemy action a section of the premises should be destroyed, service can be continued in the remainder of the premises. The batteries are kept charged through a self-regulating automatic charger.

A "Reliance" watchman's clock system and a fire alarm system have also been provided.

In connection with the canteen, refrigeration equipment and cold rooms were supplied by Coldair Ltd. (an associate company of the G.E.C.). These are supplemented by a combined ice-making and wet fish storage cabinet.

INSTITUTION PROCEEDINGS

Advantages of the "Electric." Steam v. Electric Winches

Factors affecting the choice of coloured light signals formed the subject of a paper by Mr. J. G. Holmes at a recent meeting of the Illuminating Engineering Society. The material shortage has prevented the electric vehicle from taking full advantage of the opportunity presented by the war, but it is as well to keep the subject prominently before the public. For this reason the Institute of Fuel paper by Mr. J. Steele is to be welcomed. Before the North-East Coast Institution of Engineers and Shipbuilders on February 14th, Mr. L. T. Morton put the case for electric winches as compared with their steam counterparts.

Coloured Signal Identification

THE recognition of coloured light signals was dealt with in a paper by Mr. J. G. Holmes which was read before the ILLUMINATING ENGINEERING SOCIETY in London on February 11th.

It commenced with descriptions of the construction and calibration of laboratory apparatus, similar to a Donaldson colorimeter, but combining the transmission of eleven primary beams from a common light source through colour filters and through adjustable apertures before being mixed in an integrator, any required colour being obtained by combining the appropriate amounts of the three nearest primary beams. The test colours are obtained by means of stencils selecting the primary beams, all of the same luminous intensity and brightness and each closely corresponding in energy distribution to filters that would be employed in practice.

The method of experiment is to expose the 256 colours reproducible in this way in random succession to numbers of observers of normal colour vision, who name them simply. Thus the number of times that particular colours are given the same names enable percentage contours to be drawn on the colour chart, so indicating colour-name distribution. The experiments have been repeated at different illumination levels and also to observe the effects of comparison light, adaptation, and presbiopic vision, some 43,000 observations having been analysed in this way.

The results are difficult to summarise, but are said to show that red is the ideal signalling colour, being easily produced and yet recognised down to the lowest illuminations even when not fully saturated. Green is satisfactory under usual conditions, but must be considerably restricted if blue is also used for signalling. Blue and purple cannot be regarded as satisfactory, the former requiring very high intensity and the latter depending on the dichromatic aberrations in the eye. Yellow and white are satisfactory if used separately, but they cannot be used together unless the white approximates to daylight; whereas yellow has often been thought unsatisfactory because of confusion with white, the case is really that many "whites" are unsatisfactory because they are themselves too yellow. No significant difference was found between monochromatic sodium light and the equivalent lamp and filter combination. Presbiopic vision and light adaptation both assisted the recognition of blue and purple signals.

The paper concludes with a calculation of the optimum transmission factor for green colour filters based on the results obtained, and gives results which are reasonably consistent with those adopted in practice.

Battery Vehicles

THAT very full consideration should be given to the employment of battery-propelled vehicles whenever possible was the suggestion made by Mr. J. Steele (Electrical Development Association) in a short paper which he submitted to the INSTITUTE OF FUEL in London on February 27th.

Comparing chassis designs, the author pointed out that there was more freedom in the case of the electric vehicle because less room was needed to accommodate the motor, which also required much less attention. It was usually mounted below floor level, so that the driving position was brought to the extreme front of the vehicle. The chassis could therefore be shortened by the extent of the space otherwise taken up by the internal combustion engine and its auxiliary equipment. Battery accommodation might also enforce certain changes in chassis design. The drive gearing was quite conventional, though the much simpler mechanism as a whole meant lower maintenance charges.

Lead-acid batteries were mostly used, their first cost being considerably less than that of the alkaline type. The life of the latter was more than twice as long as that of the former; it was also lighter, but it occupied rather more space for the same watt-hour capacity and was of somewhat lower efficiency. The suspension of the battery within the wheel base in such a manner as to enable the container to be rolled or lifted out facilitated inspection and quick replacement of re-charged cells, but involved a rather heavier design of underframe.

It was difficult to mount sufficient battery capacity for more than 40 miles travel per charge without reducing the space available for goods, or increasing the tare weight of the vehicle and so reducing the weight of the goods that could be carried. The minimum recharging time for a completely discharged battery was some five hours, although 33 per cent. could be replaced in one hour, 60 per cent. in two hours and 80 per cent. in three hours. At that stage the internal EMF would begin to rise, accompanied by electrolysis, splitting up the electrolyte into hydrogen and oxygen, which would raise the internal resistance, the consequential rise of temperature being very destructive to the active material of the plates. Mileage limitation imposed in this way could be avoided by the utilisation of interchangeable spare batteries.

Either drum or contactor controllers were fitted, both actuated by foot pedal; a motor speed of 2,500 RPM corresponding to a road speed between 15 and 20 MPH according to the performance required, limited the duties to which electric vehicles were particularly suited. They included the transfer of goods, or collection and distribution of merchandise over routes frequently traversed, with many stops. When employed on suitable duties "electrics" would do equivalent work quicker and more cheaply than petrol vehicles.

The author's statement of costs (tabulated and graphical) in respect of 15 and 30 cwt. vehicles showed that most of it represented standing charges, because both maintenance and depreciation (including battery renewals at intervals of three years) were more nearly due to time rather than to distance. Costs were considerably below those of petrol vehicles, due to the combination of long chassis life and small maintenance. Cost of power was insignificant, even when the price was 1d. per kWh.

Ships' Cargo-Handling Gear

DIFFERENT ways of driving deck machinery are compared in a paper by Mr. L. T. Morton (Clarke, Chapman & Co., Ltd.) that was read before the NORTH-EAST COAST INSTITUTION OF ENGINEERS AND SHIPBUILDERS at Newcastle-upon-Tyne on February 14th.

He maintained that the cost of "working" cargo could have a considerable effect on the profit made by a ship. The availability of relatively reliable and satisfactory control systems for electric motors left little justification for the cost of hydraulic transmission of power to deck machinery; 99 per cent. of ships afloat to-day were fitted with directly-driven steam or electric winches, which could withstand most arduous duties with very few stoppages, provided they were given the necessary routine maintenance and repairs.

Electric winches cost considerably more to buy than their steam equivalents; roughly two and a half times more, excluding the costs of boilers and piping, or generating plant and wiring. But they cost much less to run; ten to one in favour in some cases and seven to one was a fair ratio. One factor which greatly favoured electric winches was the absence of stand-by losses. The author said he did not doubt that many ships at present in service fitted with steam winches could have earned more profit for their owners if they had been fitted with electric winches.

Knowing approximately the amount of cargo to be handled in a year, it was not difficult to calculate whether the extra capital expenditure on electric winches would be justified. The calculation need not be affected in any way by the method of propulsion chosen, though apparently it often was. Surely the

ideal equipment would be electrically driven, deriving power from Diesel-driven generators, which could also energise such auxiliaries as were needed for use in port, when the main propulsion plant was idle. The author said he also felt that where and when heating was required in port it could be provided electrically as cheaply as by steam.

It was possible that failures of early electric winches were still influencing certain owners against their wider adoption to-day. To ensure satisfactory service, a certain amount of routine attention from skilled personnel was essential. When given that attention, electric winches probably caused fewer stoppages of cargo working than steam winches did; minor faults could be more quickly rectified by skilled electricians and modern protective features of motor control systems almost precluded the possibility of major damage resulting from careless handling.

There was no doubt that the inherent characteristics of the steam engine were more suited to cargo handling duties than were those of the electric motor. But the most widely accepted type of electric winch, fitted with a foot brake for lowering and light speed control, a magnetic brake for holding load automatically in the " off " position of the controller, and a centrifugal brake for safely limiting lowering speeds, nevertheless, was an entirely satisfactory means of handling cargo. There were several types of control for winches (briefly mentioned in the paper) that imparted to motors characteristics equivalent to those of steam engines, but they materially increased the cost of an outfit of winches; so their use on shipboard had been largely confined to such more vital machines as windlasses and capstans. Instant availability for service and silent operation were other advantages.

Small coasters were equipped with winches capable of lifting at about 50 ft. per minute, whereas passenger-cargo liners with high trunked hatches needed winch speeds of 150 ft. p.m. or more, so that the hook could be returned in time to coincide with the completion of the next load for lifting. The fuel cost per hour for operation varied almost directly with the winch power installed.

The simplest and cheapest was undoubtedly the two-speed, spur-geared, drum-controlled type so frequently fitted by Continental ship-owners, but not adopted to any extent in this country. Though cheap in first cost, drum control was not generally considered suitable for heavy duty in unskilled hands and could sometimes be more noisy than steam operation. In this country the worm-geared contactor-controlled type was preferred, with a totally enclosed watertight motor mounted on the bedplate. Control gear compartments were usually formed in the bedplate and the author expressed surprise that separate accommodation in deck houses was not more often provided; the slight loss of deck space would be compensated for by better access for proper maintenance in all weathers.

Since very satisfactory results were obtainable from modern contactor-controlled winches, the author doubted whether such special types as those operating on the Wilson or Ward-Leonard principles, the first cost of which was much greater, could be justified on an economic basis.

I.E.E. Students' Functions

THE North-Midland Students' Section of the INSTITUTION OF ELECTRICAL ENGINEERS is holding an ordinary meeting to-morrow (Saturday) at the Hotel Metropole, Leeds. Mr. H. K. Briggs is to read a paper on " AC Distribution of Underground Cables " which will cover e.h.v. and l.v. distribution, load density, cable-laying methods, fault location, etc.

The annual dinner of the North-Eastern Students' Section is to be held next Friday, March 7th, at the County Hotel, Neville Street, Newcastle-on-Tyne. Tickets (3s. 6d. each) are obtainable from Mr. G. E. Topping, 40, Cartington Terrace, Newcastle.

Heating Air-Raid Shelters

AS many public shelters are used as dormitories, some degree of artificial heating is required to keep them aired and dry, and an appropriate specification (BS/ARP 54) has been issued with the approval of the Ministry of Health (post free 4d. from the British Standards Institution). The basis taken is a fifty-person shelter which would accommodate between 25 and 35 bunks, the requirements for larger shelters being proportionate.

Three varieties of convector heaters, complying with B.S.S. 816, are permissible: viz.—the low-temperature tubular type and the type in which the element is housed in a casing, in both of which the maximum temperature rise of the outer surface is 130 deg. F, and the forced-convection heater in which the air is drawn over the element by means of a fan. A generally applicable loading for the first two is 1 W per cu. ft. for surface shelters and 0.75 W for basement and trench shelters. For forced convection the equivalent figures are 1.5, 1.0 and 1.5 W, the units having an air capacity of not less than 200 cu. ft. per min. and a loading of not less than 2.5 kW.

Tubular heaters should be fixed uniformly between 2 in. and 6 in. above floor level, e.g., along the walls or the major axis of the shelter. Forced-circulation heaters should be used where improved ventilation is needed, especially underground. Where shelters exceed 30 to 40 ft. in length, two or more units should be used. When air is drawn in from outside by a duct, the loading should be increased by 0.5 kW per 100 cu. ft. of fresh air per min. All heaters should be so placed as to prevent bedding coming into contact with hot surfaces.

Switching Arrangements

The switch and fuses must be so placed as to be readily controlled by an authorised person, but not subject to interference by others. A time-switch may be connected in circuit. A locked-up thermostat set to cut out between 55 and 65 deg. F. with a maximum differential of 8 deg. may also be provided for each bay. It should be placed, out of draught, 6 to 7 ft. above floor level, but not within 6 in. of the ceiling. Alternatively, manually operated switches may be provided to control the loading in two or more sections.

The control of forced-convection heaters should prevent the switching on of the elements without the fan, but should permit the fan to be switched on without the heater. The wiring must in all cases be directly connected to the heaters. The installation is required to comply with the I.E.E. Wiring Regulations, especially as regards earthing, and certified accordingly by the competent contractor responsible. The installation should be tested and certified by a consulting engineer or by the supply authority.

Mr. H. Brierley, the borough electrical engineer of Hampstead, informs us that the two systems of heating developed by him and described in our February 7th issue fully conform to the Specifications. These novel systems, our readers will remember, employ as their principal components galvanised iron wire and ordinary roofing tiles and drain-pipes.

Fair Trading Council

THE progress of the work of the Electrical Fair Trading Council was inevitably slowed down last year, but the Council's report for the year shows that it was still able to perform some useful services for the industry. Four ordinary meetings were held and the General Purposes Committee was constituted an Emergency Committee.

To ensure that the Purchase Tax was equitably applied, and that it was properly understood, it was decided to form a " Purchase Tax Electrical Committee," and the result has been that the Commissioners of Customs and Excise have had their attention drawn to the Fair Trading Policy and have made full use of it in drawing up their schedules of taxable and exempt items. The Industrial Supplies Department of the Board of Trade has also made extensive use of the Policy schedules from which it has taken its definitions of " controlled " articles.

So far as the general principles of the Policy are concerned, the Council is shortly inserting under Clause 4 a sub-clause dealing with the question of rebates allowed by wholesalers with a view to avoiding, as far as possible, any conflict between the terms authorised by a manufacturer and those accorded by a wholesaler when dealing with the same products.

It has also been decided to add a sub-clause (c) to Clause 1 (page 5) to the effect that no cash or settlement discounts shall be allowed to any purchaser not recognised as entitled to discounts. An appropriate amendment will also be made to Schedule 9 dealing with accumulators (stationary batteries).

The Council has found it advisable to extend the present Clause 7 (page 5) by the addition of a sub-clause (iii) binding subscribers to the Policy to use every endeavour to prevent supplies reaching any purchaser known to be violating the provisions of the Policy, except at the recognised net prices.

RECENT INTRODUCTIONS

Notes on New Electrical and Allied Products

A Porcelain Kettle

THE restriction of supplies of metals has virtually put a stop to electric kettle manufacture since the war started—and this, too, at a time when the apparatus is more in demand than it has ever been. L. G. HAWKINS, LTD., 30-35, Drury Lane, Kingsway, London, W.C.2, are to be congratulated on finding a way out of the difficulty of obtaining the necessary materials by producing a kettle made of porcelain. This "Supreme" product has a body and lid of Royal Doulton ware of attractive

"Supreme" porcelain electric kettle

design, with a wickerwork handle. The porcelain is hand made and at present the only colour supplied is dark blue.

One size only is available, namely, three pints, and the automatic immersion type element is loaded at 850 W. Although the whole of the body and handle with the exception of the copper connector guard are, of course, non-conductors of electricity, the apparatus is provided with a three-core flex and plug. The price is approximately the same as that of a high-class metal kettle of similar design. In view of the severe shortage of electric kettles at the moment we foresee a good demand for this appliance.

A New Crystal Calibrator

A CRYSTAL calibrator for radio frequency measurements on oscillators, receivers, transmitters and similar apparatus, followed by a mixing stage and listening post, in addition to a synchronising oscillator which enables very high frequencies to be determined, has been introduced by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2. Crystals operating at 100 Kc/s, 1 Mc/s, or 5 Mc/s, may be selected by means of a convenient panel switch whereby associated circuit components are also changed over. The quartz crystals used are made at the company's crystal works with special apparatus that ensures the optimum cut for each particular frequency.

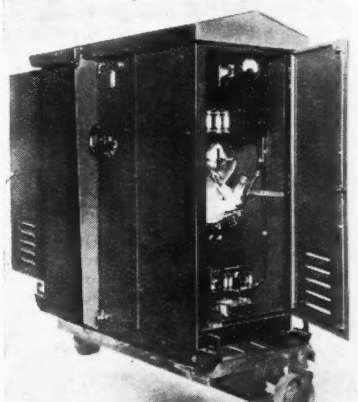
The instrument employs the heterodyne method of detection when the apparatus requiring calibration produces an output voltage. By this means a beat note is produced which is amplified by a detector, the output of which is fed into high resistance headphones. To avoid higher harmonic confusion an additional synchronising oscillator is employed (using an acorn triode) capable of being switched to either 25 or 50 Mc/s, which can be brought into tune with the corresponding harmonic of the 5 Mc/s crystal by means of a trimmer adjustment on the panel of the instrument.

All the controls are conveniently placed on a grey lacquered panel which is engraved to show the functions of each. The instrument is AC mains-operated, rectifiers and smoothing equipment being incorporated.

A Mobile Rectifier

FOR the provision in emergency of DC at temporary sites where converting equipment is wanted that can be easily installed and transported, "portable" rectifier equipment has been introduced by the HEWITTIC ELECTRIC CO., LTD., Hersham, Walton-on-Thames, Surrey. Its general form is that of a robust sheet steel outdoor kiosk which has a skid-type underbase. Lifting shackles are also provided so that the equipment may be slung from a crane, the frame being designed so that the lifting strain is taken on the underbase; or the unit can be placed on a bogie and wheeled to its position. The two glass rectifier bulbs, one at each end with an oil-immersed transformer in the middle compartment, are arranged to provide a 230-V two-wire or 230/0/230-V three-wire output of 50 kW or alternatively a 110-V two-wire or 110/0/110-V three-wire output of 35 kW from an AC 400-V three-phase input.

Adjustment of the transformer ratio to compensate for a total variation of plus and minus 10 per cent. in the AC voltage is provided for by an off-circuit tapping switch on the transformer operated by an external handwheel which may be locked at any setting against interference. Adjustment of the DC output for two- or three-wire systems at either 230 V or 110 V is simply carried out by movable links in the transformer and corresponding links on the DC output terminals. These terminals and those for the AC input take the form, on the particular equipment described, of insulated studs on the side of the equipment. Each



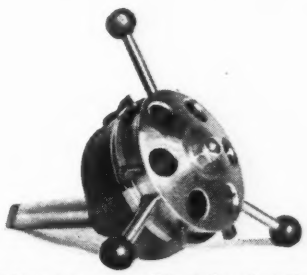
Mercury rectifier kiosk for temporary service in emergencies

group of terminals is shrouded by a steel cover as protection against weather and accidental contact.

The mercury rectifiers have ventilating fans and simple automatic starting equipment; a small panel above the bulbs carries a voltmeter and its switch for reading the various DC voltages, a DC ammeter, a DC isolating switch for use when the output of only one of the two bulbs is required, and the anode and auxiliary circuit fuses. There are no moving parts, except the simple motor-driven ventilating fan, and the kiosk is of weather-proof construction.

Lathe Adaptor

A USEFUL small-lathe adjunct that speeds up production is a (six tool) tail-stock turret head made by FRANCE, HARRY & Co., 1051, High Road, Whetstone, London, N.20, either of semi-steel or malleable iron. Of the two major portions of the tool, the body has an internally coned face, a machined spigot, and carries the ground morse taper arbor, and the pawl which locks the head.



Tail-stock turret head for lathe adaptation

The head, which has an externally coned face, matches up with the coned face in the body and these two faces are ground together to fit so as to avoid chatter. The head has a limit-fit hole into which the spigot of the body fits; the object of the spigot is to give additional support to the tapers and keep them in alignment when the tool is in operation, while the coned faces allow for adjustment for wear.

Adjustment is made by means of a Thackray washer interposed between two brass washers, one of which is bored free, and the other has a screwed thread which is locked up by a domed nut in the centre.

The head is equally spaced round the periphery by six milled parallel slots, providing six indexes of the tool positions and locked by means of a spring-loaded pawl with hardened VEE faces situated on the top of the tool, which is handy for the operator. A bakelite knob attached to the end of the pawl protects users' hands from injury.

The head is drilled, bored, and reamed in line on a specially set up lathe, thus ensuring accuracy. The sizes of holes are ½-in., ⅝-in. and ¾-in., according to the model to which they are applied. The tools are secured in the head by "Unbrake" square-headed screws, or socket screws. The head is chromium plated and polished and fitted with three spaced bakelite-knobbed handles for rotating it into its various positions. The weight is approximately 12 lb.

Another model is being introduced to be fixed to the saddle of the lathe. It can also be used in the tail stock by the removal of four screws in the trunnion bracket attached to the turntables.

When attached to the saddle, a special turntable is supplied which, by a simple single-indexed locking device, enables the operator to swing the tool through one right angle; it is then possible by rotating the head to do six operations traversing or, alternatively, six operations cross-traversing.

It is attached to the saddle by removing the complete tool rest from the cross slide and using the two existing bolts in the T-slotted foundation ring, which bolts the tool rest to the cross slide.

These tools are being manufactured in three sizes at present for lathes of 3½-in./4½-in., 5-in./6-in., and 6-in./8-in. centres.

COMMERCIAL and INDUSTRIAL NEWS

Limitation of Supplies Returns. Export Control Orders

New Supplies Restriction Requirement

IN order that the Board of Trade shall be able to keep a closer watch on transactions under the Limitation of Supplies Orders, to prevent evasions of the restrictions, it has issued new Directions. The one relating to the Miscellaneous (No. 5) Order stipulates that manufacturers shall notify the Board of supplies to other registered person during the restriction period December 1st, 1940, to May 31st, 1941, of controlled goods of a value exceeding by more than £1,000 the value of goods of the same class supplied to that person in the corresponding period of 1939-40. The notification must be made by March 1st, or within fourteen days of the supplying of the goods, and must give the name of the person supplied and the class and total value of the goods supplied during the restriction period.

Similarly notification must be made to the Board by retailers who have received from a registered person controlled goods exceeding by more than £1,000 the value of goods received from the supplier in the corresponding " standard " period.

It is also provided that any registered person who loses, through enemy action or otherwise, any of the books or records containing particulars of his dealings in controlled goods during the standard or restriction periods is to notify the Board of Trade within fourteen days.

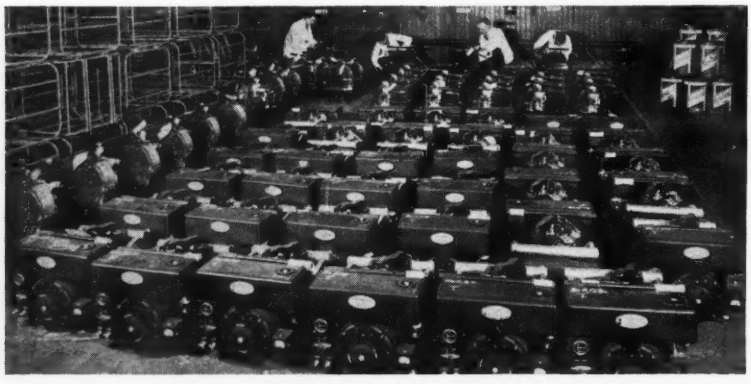
All returns under the Directions must be sent by registered post to the Industrial Supplies (Registers) Department, Board of Trade, Carlton Hotel, Bournemouth.

Cable Jointers' Wages

The National Joint Industrial Council for the Electricity Supply Industry announces that in lieu of the present increase of 1¾d. per hour in the wages of plumber-jointers, jointers and jointers' mates in all districts which operated from July, 1940, there is to be a war bonus of 2¼d. per hour. This bonus, which is to be reckoned in calculating overtime, will operate from the commencement of the first full pay period following February 13th, and will remain firm until July 1st, 1941. It will apply to plumber-jointers, plumber-jointers' mates, jointers and jointers' mates in all districts with the exception of plumber-jointers and plumber-jointers' mates in the Greater London Area.

Light-weight Generating Sets

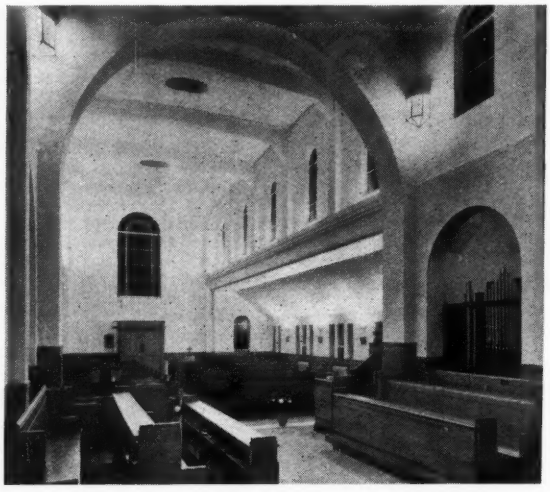
The accompanying illustration taken in the B.M.B. Engineering Co.'s test room shows a batch of 230-V, 1,500-W " Onan " generating sets undergoing final tests. Weighing only 110 lb. each, these units are claimed to be the lightest generating sets of their type in the world.



Light-weight " Onan " generating sets undergoing their final tests

Glareless Church Lighting

A lighting scheme recently completed at St. Modwen's Church, Sutton-in-Ashfield, is noteworthy on account of there being no glare, shadows, or troublesome bright source light to worry the clergy, choir or congregation. The main lighting in the nave is indirect and comes from fittings sunk into recesses under windows, while indirect brackets are fitted on the walls between the windows of the side aisle. When the Savoy Chapel was redecorated, this system was also adopted. In the chancel two fittings in the angle of the walls behind the chancel arches and one in the ceiling behind the beam over the altar, illuminate the altar and choir with semi-indirect light. The scheme was carried out by G. V. D. Illuminators, Ltd., in conjunction with the architects.



Glareless lighting at St. Modwen's Church, Sutton-in-Ashfield

Industrial Registration

Two Orders providing for the registration of men and women workers and for the listing of all undertakings engaged in essential war work were approved last week by the Ministry of Labour's Joint Consultative Committee. It is apparently not the intention of the Minister of Labour to make an all-embracing Order for the registration of workers but to proceed by degrees, probably by areas and age groups.

The second Order will impose a number of obligations upon war industries, such as the payment of recognised rates of wages, the observance of proper conditions of employment and the training of employees. Such concerns will be restricted in their right to dismiss workers without consultation with an official of the Ministry, except for serious misconduct. The discipline of workers will be in the hands of the Ministry's officials.

Public Trading in Victoria

The Victorian Legislature recently passed a Bill empowering the State Electricity Commission and other electricity undertakings to trade in electrical apparatus and to carry out electrical installation work. The terms of the Act are comprehensive as electrical apparatus is defined as "any appliances, fittings, lamps or other apparatus designed for operation by electricity and includes any articles or fittings of any kind for use in connection with any such apparatus."

The Commission or other undertaking can purchase, take on hire, sell or let on hire any electrical apparatus; install, maintain, repair or recondition it; and enter into any agreement and provide any materials and work in connection therewith. The same applies to service lines and installations. Moreover the Commission, or undertaking, is empowered to advance money for the above purposes.

Export Control

The Board of Trade has issued the Export of Goods (Control) (No. 4) Order, 1941, which took effect on February 27th. This provides, *inter alia*, that insulated electric wires and cables shall not be exported, save under licence, to a number of destinations, including Japan, Spain, Portugal, Iran, Iraq, Turkey and to Russian ports not on the Black Sea, Baltic Sea or Arctic Sea.

Exports to South America

Exports to Brazil, Chile, Colombia and Peru are made subject to licence by an Order made last week by the President of the Board of Trade which comes into operation on March 6th. The reason for the Order is stated to be the necessity for ensuring that the utmost possible benefit is secured from United Kingdom exports and that the volume of exports is kept within the means of payment. Applications for licences should be addressed to the Export Licensing Department, Board of Trade, Inveresk House, 346, Strand, London, W.C.2.

The G.E.C. Overseas

Of the many ways in which British electrical concerns are safeguarding their export markets, one of importance is the mainten-

ance and improvement of their branches overseas. Some typical samples of improvements which have been carried out in this direction are shown by the General Electric Co., Ltd. The company has recently extended existing premises in Johannesburg and has also opened a new store at Selby, South Africa. At Johannesburg, the company's Magnet House has been augmented by a sumptuous suite of showrooms, and executive offices, which include recreation and rest rooms for the staff. One showroom which is reserved for special lighting demonstrations, is equipped with a miniature stage for the demonstration of sample stage lighting effects, etc., and is also arranged for showing various methods of light distribution and control. The new entrance hall is an example of the effective use of glass bricks and it serves as an excellent medium for displaying and demonstrating the quality and efficiency of G.E.C. fluorescent tube lighting and architectural strip lighting. The new store at Selby is of modern design with an imposing facia.

One of the showrooms at the redesigned premises of the G.E.C. in Hong Kong

Another significant indication of progress, further afield, is provided by the extensive modifications which have been carried out at the company's premises in Hong Kong. It had long been considered that the original showrooms were inadequate for the effective display and demonstration of modern electric lighting, heating and other types of domestic and industrial equipment. The floor space has therefore been considerably increased and the internal decorations and furnishings have been designed according to the modern idea suggested by the electrical merchandise to be exhibited.

Salary Increases at Lowestoft

To meet the cost of living increases, salaries of members of the administrative, technical and clerical staffs of the Lowestoft Corporation Electricity Department have been increased by 10 per cent. where the salary does not exceed £300 per annum, and by various degrees in cases above that.

Agencies in Baghdad and Teheran

A firm of agents with branches in Baghdad and Teheran, wish to represent reliable British makers of electrical installation articles, wires and cables, meters, fans, lighting fittings, lamps, household appliances, etc. We shall be glad to pass on the names of interested firms to our inquirers.

Outdoor Lighting Fittings

There are four B.S. Specifications covering A.R.P. lighting fittings, namely BS/ARP 16, 20, 21 and 37. Each deals with a different level of illumination ranging from 0.0002 to 0.2 foot-candle. The specification relating to 0.002 foot-candle (BS/ARP 16), which was first issued in September, 1939, has been revised. Two types are now specified for minimum spacing/height ratios of four to one and two to one. In the original specification only the first type was specified.

Preference should in general be given to methods which use sources of low power rather than those which reduce the candle-power by obscuration. Descriptions and illustrations of typical fittings, notes on the use and maintenance of A.R.P. lighting fittings, including the reflection factor of interior surfaces are given. The importance is emphasised of increasing the contrast between the brightness of obstructions and their surroundings and of so placing and screening lights used near water that they shall not be reflected from its surface.

The data furnished afford adequate guidance in regard to installation. Simple types of illumination gauges, designed to BS/ARP 30, adapted for use at these low levels of illumination are now available.

Copies of BS/ARP 16 can be obtained for 8d. post free, from the British Standards Institution.

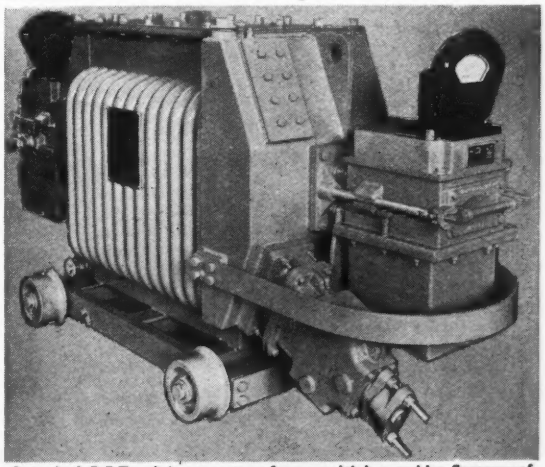
Brazilian Railway Contract for British Company

According to the *Financial Times*, the Metropolitan-Vickers Electrical Co. is to be given the contract for the second stage in the conversion of the Central Railway of Brazil from steam to electrical operation. The company was responsible for the first stage of the electrification, involving the section from Rio de Janeiro to Nova Iguassu and a branch line, which are reported to have been very successful in operation. The proposed extension will be to Barra Mansa near which a large steel works has been established. The value of the order is said to be in the neighbourhood of £1,000,000.

B.E.T. Activities

A heavy demand for transformers ranging from 30,000 kVA to 50 VA is reported by the British Electric Transformer Co., Ltd., an associated company of Crompton Parkinson, Ltd. Five of the first-named of the five-limbed core type with a ratio of 132/33 kV were built during 1940 for A.R.P. emergency work. It is suggested that this type might have scope in the export market. In the intermediate sizes one of the most notable orders was for five 1,300-kVA 6,300/440-V air-blast-cooled transformers, with internal core ducts for supplying boiler-house auxiliaries.

Among a large number of furnace transformers is one of 2,000-kVA, three-phase, delta-star, with tappings on the 6,600-V side to vary the secondary voltage from 140 to 85 in six steps; in the same tank is a 30 per cent. reactor with 5 per cent. tappings. Orders put in hand for export included many for the Dominions, South America, Spain, Palestine and the Far East. Examples of these are a 16,500-kVA 92/6.6-kV transformer, which is to be impulse tested, and three 12,000-kVA 10,500/250-V shell-type OFW banks with h.v. on-load tap changing for electric furnaces. There are also six 8,000-kVA water-cooled single-phase units forming 110/11-kV banks and four similar units for 66/11-kV banks, all for New Zealand. A single-operator arc-welding oil-immersed equipment, consisting of a double-wound transformer and multi-tapped reactor is representative of the many orders in hand for this class of work.



A typical B.E.T. mining type transformer with h.v. and l.v. flameproof draw-out circuit-breakers and detachable cable boxes

Home Trade Register

A revised edition of the "Home Trade Register" giving a list of the names of manufacturers and/or wholesalers registered under the Limitation of Supplies (Miscellaneous) (No. 5) Order on January 8th, 1941, can now be obtained from H.M. Stationery Office or through any bookseller, price 2s. 6d.

Trade with Roumania

The Board of Trade announces that the provisions of the Trading with the Enemy Act apply to Roumania in the same way as they apply to enemy territory. It is accordingly a punishable offence to have commercial, financial or other intercourse or dealings with or for the benefit of any person in that territory. Inquiries should be addressed to the Trading with the Enemy Branch, 24, Kingsway, London, W.C.2.

Cable Makers' Wages

The Joint Industrial Council for the Electrical Cable Making Industry informs us that there will be no cost-of-living alteration of wages on the third pay-day in March.

New Mining Regulations

On February 19th, during a debate on coal supplies, Mr. Grenfell, the Secretary for Mines mentioned that there was in course of preparation—in fact it was already being printed—a report on the use of electricity in mines. Draft regulations were contained in the report, which he was sure would please hon. members. It had gone further than he had thought possible in so short a time towards presenting to the industry a new code regarding electricity in mines.

New Catalogues and Lists

Johnson & Phillips, Ltd., Charlton, London, S.E.7.—Publications S.G. 26, 27 and 28, dealing with type SF automatic air-break switch fuse gear, industrial oil circuit-breakers with back-up fuses, and the new "Eetee" low-voltage h.r.c. fuses incorporating a striker pin tripping device.

Rawlplug Co., Ltd., Rawlplug House, Cromwell Road, London, S.W.7.—During

recent months various additions have been made to the range of "Rawlbolts." A new reference chart now available brings the range completely up to date.

Changes of Address

The British Aluminium Co., Ltd., has moved its Birmingham branch office to Lansdowne House, 41, Water Street (telephone: Birmingham Central 3053-4), and the London branch to Trafalgar House, Waterloo Place, S.W.1 (telephone: Abbey 1365). The Bristol office and warehouse are closed temporarily.

The offices and stores of the Magna Wire & Cable Co., Ltd., have been moved to 27-31, Upper Ground, Blackfriars Road, London, S.E.1. The telephone number is unchanged.

Berry's Electric, Ltd., has moved its Manchester office to Lloyd House, 18, Lloyd Street, Albert Square, Manchester, 2.

Aircraft Identification

We regret that in our review of "Aircraft of the Fighting Powers" in our February 14th issue, the price was inadvertently given as 7s. 6d. The correct price is 10s. 6d.

Report on Insull Affairs

Readers will recall the sensation caused in 1932 by the flight of Samuel Insull, the British-born American financier, from the United States to avoid trial on a number of charges. He had built up a colossal financial structure in the American electricity supply field which was unable to withstand the shocks of the 1930 slump. Eventually he surrendered to the American authorities and was acquitted after protracted legal proceedings. He died in 1938.

The trustees of the Insull Utilities Investment, Inc., have now issued a final report on the affairs of the company in which they state that the actual balance of funds recovered was $226,788, but against this were claims totalling over $50,000,000. Altogether the amount recovered from the Insull properties has totalled $2,353,559.

American Company's Record Business

The president of the American General Electric Co. (Mr. C. E. Wilson) stated recently that the total value of orders received by his company in 1940 was $654,190,000, as compared with $360,748,000 in 1939, an increase of 81 per cent. Orders for equipment for national defence purposes are said to account for $250,000 of the total, but even with this deducted the figure was a record one.

Earth Fault Protection

The lecture on "Earth Fault Protection in Rural Areas" by Mr. H. G. Taylor, originally arranged for February 18th, is to be given next Monday at the Conference Room of the Association of Supervising Engineers at Aldwych House, London, W.C.2.

INFORMATION DEPARTMENT

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, etc., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the following:—

RILLING-WAHL (late Marchant Hill & Co.), hair clippers.

DALLAN pyramid fittings.

THERMAC electric fire.

TRADE MARK APPLICATIONS

AMONG recent applications for British trade marks are the following, objections to any of which may be entered within one month of February 19th:—

Britool. No. 611,141. Class 8 (IV). Hand tools.—The British Tool & Engineering Co., Ltd., Britool Works, Fourth Avenue, Bushbury, Wolverhampton.

Dixolite. No. 613,060. Class II (IV). Pocket electric torches.—Arthur S. Dixon, Ltd., 229-231, High Holborn, London, W.C.1.

ELECTRICITY SUPPLY

Mutual Assistance in Scotland. M.P. and Manchester's Coal Supplies

Billingham-on-Tees. — SHELTER LIGHTING.—The Urban District Council is to spend £480 on the installation of electric lighting in forty-six communal shelters.

Blackburn.—ELECTRICITY TARIFFS.—The Electricity Committee has considered a report on the effect of the increased cost of production on existing tariffs. It was decided that consideration of any necessary tariff adjustment should be postponed until the annual report is presented in May.

Bolton.—SUPPLY EXTENSION.—The Corporation Electricity Committee has obtained an order to provide a supply to the St. Albans Sand & Gravel Co., Ltd., at Bull Head, Great Lever.

Brighton.—REWIRING OF SANATORIUM.—The Corporation Health Committee has asked the electrical engineer to prepare specifications for rewiring at the orthopædic and isolation blocks of the borough sanatorium.

RIPPLE CONTROL.—A ripple control system is to be installed by the Corporation Electricity Committee at a cost of £3,200.

Cheltenham.—PLANT OVERHAUL.— The Town Council has approved a scheme for the overhaul, etc., of electrical plant at an estimated cost of £30,000.

Cleckheaton.—SUBSTATION.—The Spenborough U.D.C. has approved plans for the erection of a substation by the Yorkshire Electric Power Co.

Cookham. — SUBSTATION. — The Rural District Council has approved plans for the erection of an open-air substation by the Ascot District Gas and Electricity Co., Ltd.

Exeter.—LOAN. The Electricity Committee is seeking sanction to borrow £4,000 for transformers and substation equipment.

FIRE-FIGHTING EQUIPMENT. — The Committee has approved a scheme for fire-fighting equipment for Electricity House at a cost of £812.

RATE RELIEF.—A sum of £3,000 is to be contributed from the Electricity Department's profits to the relief of rates.

Fochabers (Moray).—OBJECTION TO INCREASED CHARGES.—The Ratepayers Association is to protest to the Electricity Commissioners, the Grampian Electricity Co. and the Secretary of State for Scotland against a proposal by the Grampian Co., which is shortly to take over the village electricity scheme from the present suppliers and to charge 8d. per kWh for lighting instead of 6d. as at present. The existing lighting system was instituted by the late Duke of Richmond and Gordon about forty years ago.

Manchester Coal Supplies

IN the House of Commons on February 19th Mr. R. Duckworth asked the Secretary for Mines whether he was aware that in order to force the Manchester Corporation Electricity Department to accept the conditions of sale which were being imposed by the Executive Boards of the coal industry, coal supplies were being diverted from the Manchester Corporation, notwithstanding the fact that that Corporation was already having to lift large quantities from stock; and if he would take steps to remedy this grievance.

Mr. Grenfell said he could not agree that the position, as regarded coal supplies to the Manchester Electricity Department, was as stated, but he would take such steps as might be necessary and practicable to maintain adequate supplies. As to the position generally, he understood that, as a result of the intervention of the Mines Department, arrangements were now being made for this question to be dealt with by means of a joint discussion between the Conjoint Conference of Public Utility Undertakings and owners' representatives of the colliery districts concerned.

Fort William.—STANDBY ALTERNATOR.—The Town Council has received approval from the Electricity Commissioners to purchase a new alternator for use in an emergency.

Glasgow.—MAINS EXTENSIONS.—The Corporation Electricity Committee is to extend mains at a cost of £5,686.

MUTUAL ASSISTANCE SCHEME.—At a recent meeting of the Corporation Electricity Committee the manager reported that as a result of a meeting which he had attended recently with the Regional Commissioner for Civil Defence and representatives of the larger electricity undertakings in Scotland it had been suggested that arrangements should be made for undertakings to render mutual assistance by the provision of equipment and personnel in the event of damage by enemy action; that Mr. A. E. MacColl, manager for Scotland, Central Electricity Board, had been nominated to act as Co-ordinating Officer and to obtain a return from undertakings of the reserve of materials and skilled labour which each had available; and that he (the manager) recommended that in the circumstances the Corporation should take part in the suggested arrangements. The Committee agreed to co-operate with the other undertakings in the manner indicated, and authorised the manager to furnish the necessary returns to Mr. MacColl.

Hendon.—SHELTER APPLICATIONS.—The Town Council is considering applying to the Board of Education for approval of a scheme for installing electric lighting, electrical tubular heaters and extract fans in school shelters.

Hyde.—RIPPLE CONTROL.—A conference of local industrialists is to be held to consider the scheme for ripple control of sirens and other warnings.

Inverness.—THE GLEN AFFRIC SCHEME.—The Town Council is to make representations urging that the Glen Affric hydro-electric project, which is being sponsored by the

Grampian Electricity Supply Co., should proceed by way of a Bill instead of a Provisional Order. It was explained that if the procedure was to take the form of a Bill there would be a vote of the House of Commons, whereas a Provisional Order would mean the taking of evidence on both sides.

Kent.—OPPOSITION TO POWER BILL.—The County Council Parliamentary Committee recommends opposing the Bill for the amalgamation of the undertakings of the South East Kent Electric Power Co., Ltd., and the West Kent Electric Co., Ltd., with the Kent Electric Power Co., though the Committee states that it expects that representations being made on behalf of the Council for safeguarding county interests will be met. The Bill is also to be opposed by the Chislehurst and Sidcup Urban District Council.

Lichfield.—OVERHEAD LINES.—The Rural District Council has approved proposals of the Tamworth District Electric Supply Co., Ltd., for overhead electricity extensions.

NEW TRANSFORMER. — The Corporation Electricity Committee is to provide an additional 300-kVA transformer and l.v. outgoing feeder at a cost of £460 to meet increased load.

Liverpool.—CONTRIBUTION TO RATES.—The City Electric Power and Lighting Committee is to allocate £25,000 from the profits of the electricity undertaking towards the relief of the rates. Last year the contribution was £30,000.

Llandrindod Wells. — CHEAPER ELECTRICITY.—The Urban District Council has reduced its electricity charges as follows:—Lighting, from 5½d. to 4½d. per kWh; power, from 3d. to 2½d.; heating and cooking, from 1½d. to 1d.; and the two-part tariff "unit" charge, from 1d. to ½d.

Lowestoft.—DEARER ELECTRICITY.—Electricity charges have been increased by 7½ per cent. as from February 12th.

Manchester.—SHELTER INSTALLATIONS.—The Corporation Health Committee is to provide tubular heaters and lighting at shelters at Abergele sanatorium at a cost of £97 and at Langho colony at £280.

Middlesbrough. — LOANS. — The Town Council is to apply for sanction to borrow £2,000 for mains, £2,500 for services and £250 for meters.

Paisley.—LOAN APPLICATION.—The Corporation is to apply to the Electricity Commissioners for sanction to borrow £15,000 to cover the cost of hired appliances (£10,000) and meters (£5,000).

Peterborough.—SHELTER INSTALLATIONS.—The Town Council is to make application to the Board of Education for sanction to the expenditure of £3,137 for the heating and lighting of school shelters by electricity.

Scarborough. — SUBSTATION ENLARGEMENT.—The Corporation Electricity Committee is to enlarge a substation at a cost of £655.

Swansea.—MOBILE X-RAY UNIT.—The Board of Management of Swansea Hospital is recommended to purchase a mobile X-ray unit.

Tottenham.—SHELTER HEATING.—Experiments are being undertaken by certain electrical contractors and the borough engineer in connection with the heating of public shelters.

Tubular heating is to be installed in surface shelters at Devonshire Hill, Rowland Hill, and All Hallows' Schools.

Walsall.—PROTECTION SCHEMES.—The Corporation Electricity Committee has approved schemes for the protection of the supply at a cost of £3,305.

FACTORY SUPPLY.—A supply to a new factory is to be provided at a cost of £5,150.

Warrington.—NEW SWITCH HOUSE AND EXTENSIONS.—The Corporation Electricity Committee is to erect a new switch house at Howley and also extend the Silver Street sub-station.

Warwickshire.—ELECTRIC FIRES IN SHELTERS.—The county chief warden recently reported to the Emergency Committee that the 750-W fires provided for the heating of the majority of the wardens' posts had proved to be inadequate. The county architect was authorised to arrange where necessary for electric heaters up to a maximum of 2,000 W to be provided.

PREVENTING SIRENS FREEZING. — The Emergency Committee has obtained approval to the installation of electric heaters and thermostats to prevent freezing of 45 sirens at a cost of £749.

Wolverhampton. — CONTRIBUTION TO RATES.—A sum from the profits of the city electricity undertaking not exceeding 1½ per cent. on the outstanding loan debt of the undertaking is to be transferred in aid of the rates for the year ending March 31st, 1942.

Workington.—LOAN FOR METERS.—The Corporation Electricity Committee is seeking sanction to borrow £1,000 for meters.

Overseas

Afghanistan.—ELECTRIFICATION SCHEME.—The authorised capital of 60 million Afghani rupees of the newly formed Afghan National Electric Co. has been fully subscribed. The Afghan National Bank leads the investors by contributing half the capital. The company will enjoy the monopoly of generation and supply of electricity throughout Afghanistan for a period of fifty years.

Holland.—RATIONING OF ELECTRICITY.—A *Reuter* message from Amsterdam states that the rationing of gas and electricity is being introduced in Holland. The basis of the rationing system is last year's consumption. Householders are allowed from 31 to 47 kWh of electricity a month, according to the size of apartments. For those who exceed their allowance fines will be imposed amounting to half the gas or electricity bill.

Philippine Islands. — HYDRO-ELECTRIC SCHEME.—According to the *Indian & Eastern Engineer*, the Commonwealth Government's first hydro-electric power project is rapidly taking shape, with contracts totalling 3,750,000 pesos already awarded, and bids on three others to be opened in the near future. The scheme comprises an artificial reservoir and power plant to be built on the Caliraya River, Lumbang, Laguna, and transmission lines to Manila. Construction is under the direction of the National Power Corporation which in turn is governed by the National Power Board appointed by the President.

It is planned to start delivery of electric power on January 1st, 1942. The plant will have a capacity of 24,000 kW, enabling it to supply 100 million kWh of power annually. Three turbines are to be installed initially, but the whole system is designed to permit later installation of one more similar unit.

The first and biggest customer of the new plant will be the Manila Electric Co., which will be able to buy Government power to supplement its own supply rather than build new plants to meet the gradually increasing demand. Meralco has two power plants, one hydro-electric of 16,000 kW capacity about 55 miles from Manila and a steam plant of 29,000 kW in Manila. During the last few years, the demand for power in Manila has been rising at the rate of about 2,500 kW, or about 14,000,000 kWh a year. Last year the demand during the Christmas season almost reached the plant capacity.

In addition to the Caliraya project, the corporation has been making an extensive investigation of the Islands' water power possibilities. A number of water power projects appears to be economically warranted for construction as and when the power market develops and funds are available. These projects embrace various localities extending from northern Luzon to southern Mindanao.

TRANSPORT

Belfast. — TROLLEY-BUS EXTENSION. — Another section of the Corporation's trolley-bus service, between Cregagh Road and City Hall in the East End of the City, has recently been opened. A West End service was already in operation and the conversion of the entire system is to proceed by instalments.

Birmingham.—PROPOSED INCREASE IN FARES.—The City Transport Committee has applied to the Ministry of Transport for permission to increase all fares on trams, trolley-buses and motor-buses by a half-penny, to introduce an ordinary fare of 8d. available for issue all day on the existing 4d., 4½d. and 5d. stages, and to raise the workmen's return fares by 1d.

Blackburn.—LOUDSPEAKERS FOR BUSES.—The Corporation Transport Department has installed a microphone and loudspeakers in one of its double-deck buses as an experiment to assist passengers and conductors in the black-out. The microphone is fitted in the driver's cab.

Darlington.—EXTENSION OF TIME.—The Town Council has decided to apply to the Ministry of Transport for an extension of the time limit allowed for the introduction of trolley buses on another three routes. Under the Additional Routes Order of 1936 the Council's time limit expires on July 14th.

Hartlepools.—YEAR'S WORKING.—The annual report of the Hartlepool and West Hartlepool Corporations' joint transport undertaking shows a surplus of £6,654. Of this West Hartlepool receives £3,516 and Hartlepool £3,138.

L. & N.E. Railway.—NEW ELECTRIC LOCOMOTIVE.—A new electric locomotive, just completed by the L.N.E.R. at its Doncaster works, is the first of seventy mixed traffic engines planned for the Manchester-Sheffield electrification scheme, upon which work was well in hand before the war. In September, 1939, it was decided that only the first of the electric locomotives should be proceeded with so that work of national importance could be taken in hand. The new engine is designed to handle main line passenger and express goods trains up to speeds of 65 MPH, to haul 1,000-ton mineral trains across the Pennines, and to carry out local passenger and goods train duties. It is carried on two bogies measuring 50 ft. 4 ins. in length over buffers, and picks up its 1,500-V DC supply from an overhead wire by means of either of two pantograph collectors mounted on the roof. An interesting feature of the equipment is the electrically heated boiler producing 750 lb. of steam per hour to provide all the steam heating required for the longest trains operated between Manchester and Sheffield. Electric locomotive 6701, as it is numbered, is painted L.N.E.R. green and will soon be given tests.

Sunderland.—EXTENSION OF TIME.—The Ministry of Transport has extended for three years the time limit under the Sunderland Corporation Act, 1935, for the construction of tramways in Whitburn Road and part of Dykelands Road.

Tasmania.—TROLLEY-BUSES FOR HOBART.—The purchase of two trolley-bus chassis in England has been decided on by the Hobart City Council, states *Tenders*. An option over a further six chassis has also been secured but purchase will depend on whether the proposed conversion of the Cascades route from trams to trolley-buses is proceeded with while the war is in progress.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1939

5819. "Electrical exploration of the sub-soil." Compagnie Générale de Géophysique. July 13th, 1938. (532798.)

18737. "Gas-blast electric circuit-breakers." British Thomson-Houston Co., Ltd., H. Trencham and H. E. Cox. June 27th, 1939. (532869.)

20064. "Electrical apparatus provided with gaseous insulating and dielectric media." British Thomson-Houston Co., Ltd. July 9th, 1938. (532670.)

20890. "Control of electric-discharge tubes or other electrical apparatus." Franco-British Electrical Co., Ltd., and A. H. Brackensey. July 18th, 1939. (532675.)

21505. "Railway traffic control apparatus." Westinghouse Brake & Signal Co., Ltd. January 14th, 1939. (532683.)

21606. "Electric power cables." Standard Telephones & Cables, Ltd., T. R. Scott, J. K. Webb and S. G. Foord. July 25th, 1939. (532687.)

21608. "Electric cables." Standard Telephones & Cables, Ltd., T. R. Scott and J. K. Webb. July 25th, 1939. (Addition to 504720.) (532688.)

21707. "Electric timing apparatus." Igranic Electric Co., Ltd., and P. W. Townsend. July 26th, 1939. (532696.)

21744. "Reflectors." British Thomson-Houston Co., Ltd. July 27th, 1938. (532811.)

21757. "Storage battery cells, and liquid-level control devices therefor." Richardson Co. June 1st, 1939. (532699.)

21778. "Electric plug-and-socket connectors." Automatic Telephone & Electric Co., Ltd., A. E. Graves and W. A. Harrison. July 26th, 1939. (532701.)

21779. "Automatic or semi-automatic telephone systems." R. Mercer (Associated Telephone & Telegraph Co.). July 26th, 1939. (532728.)

21781. "Automatic or semi-automatic telephone systems." R. Mercer (Associated Telephone & Telegraph Co.). July 26th, 1939. (532729.)

21782. "Automatic or semi-automatic telephone systems." J. E. Pollak (Associated Telephone & Telegraph Co.). July 26th, 1939. (Addition to 516348.) (532730.)

21783. "Automatic or semi-automatic telephone." J. E. Pollak. (Associated Telephone & Telegraph Co.). July 26th, 1939. (Addition to 516409.) (532813.)

21812. "Optical projection of images." British Thomson-Houston Co., Ltd., and A. Bowen. July 27th, 1939. (532814.)

21878. "Electric remotely controllable adjusting systems." Telefunken Ges. für Drahtlose Telegraphie. July 28th, 1938. (532705.)

21890. "Variable electrical resistances." C. A. Pugh and Plessey Co., Ltd. July 27th, 1939. (532710.)

21933. "Electric motor control systems particularly adapted for tension control in strip-rolling mills." Westinghouse Electric International Co. July 28th, 1938. (532715.)

21988. "Electron discharge apparatus using secondary emission." Standard Telephones & Cables, Ltd., and A. I. Vangeen. July 28th, 1939. (532717.)

21990. "Discriminating circuits particularly for synchronising systems in television." Standard Telephones & Cables, Ltd., and D. N. Corfield. July 28th, 1939. (532718.)

22034. "Control apparatus for the remote control of motors." F. W. Wardley. (Bendix Aviation Corporation). July 28th, 1939. (532720.)

22160. "Electric discharge tubes." Marconi's Wireless Telegraph Co., Ltd. July 30th, 1938. (532886.)

22560. "Lamps." W. Sugg & Co., Ltd. and P. C. Sugg. August 3rd, 1939. (Cognate application, 1224/40.) (532819.)

22790. "Tumbler switches." General Electric Co., Ltd., H. S. Hughes and J. Read. August 8th, 1939. (532735.)

23278. "Cable joints and terminations." Standard Telephones & Cables, Ltd., T. R. Scott and J. F. Morley. August 11th, 1939. (532721.)

23454. "Automatic voltage regulating means for alternators." F. T. S. O'Donnell, Griffin & Co., Pty., Ltd. and W. M. Robertson. August 14th, 1939. (532823.)

23528. "Manufacture of insulating materials." Mycalex (Parent) Co., Ltd., and A. W. H. Wedlock. August 15th, 1939. (532824.)

23560. "Automatic telephone systems." Siemens Bros. & Co., Ltd., D. P. Long, E. W. Durkin and C. L. Peters. August 15th, 1939. (532896.)

24025. "Portable spot-welding apparatus." E. F. Cooper. August 19th, 1938. (532825.)

24122. "Interlocking mechanism for enclosed electric switch fuse combinations and the like." J. A. Crabtree & Co., Ltd., and H. F. McLoughlin. August 22nd, 1939. (532742.)

24136. "Electric lamp bulb enclosures." W. G. Riley. August 22nd, 1939. (532743.)

24182. "Electric braking control systems for electric motors." British Thomson-Houston Co., Ltd. August 22nd, 1938. (532744.)

24625. "Portable electric battery lamps." Oldham & Son, Ltd., and H. Holt, Jun. August 28th, 1939. (532827.)

25455. "Caps and holders for electric lamps." British Thomson-Houston Co., Ltd., H. R. Ruff and W. Rule. September 8th, 1939. (532590.)

25456. "Tubular means for mounting electric lamps." British Thomson-Houston Co., Ltd. September 8th, 1938. (532591.)

25500. "Glass fibre products." British Thomson-Houston Co., Ltd. September 10th, 1938. (532596.)

25503. "Telephony." Philips Lamps, Ltd. September 12th, 1938. (532597.)

25527. "Electric hot-plates." Revo Electric Co., Ltd., and F. H. Reeves. September 11th, 1939. (532601.)

25531. "Electric selector switches or regulators." Contactor Switchgear, Ltd., and C. A. Bradbury. September 11th, 1939. (532763.)

25696. "Wave transmission networks." Standard Telephones & Cables, Ltd. November 5th, 1938. (532619.)

25741. "Apparatus comprising gas-cooled high-pressure metal-vapour electric discharge lamps." General Electric Co., Ltd., V. J. Francis and G. H. Wilson. September 13th, 1939. (532621.)

25799. "Electrical measuring instruments." British Thomson-Houston Co., Ltd. September 15th, 1938. (532623.)

25991. "Alternating current electric motors." British Thomson-Houston Co., Ltd., and A. H. Maggs. September 16th, 1939. (532636.)

26003. "Electric switches actuated by doors." H. E. Flory. September 16th, 1939. (532637.)

26067. "Remote control mechanism for wireless receiving sets." Philips Lamps, Ltd. September 21st, 1938. (532640.)

26091. "Electric arc welding." British Thomson-Houston Co., Ltd. September 16th, 1938. (532645.)

26112. "Electrical spot welding." Bradley & Co., Ltd., and H. Bradley. September 19th, 1939. (532649.)

26157. "Indicators for radio navigation." Standard Telephones & Cables, Ltd. October 12th, 1938. (532654.)

26221. "Holders for electro-mechanical resonators." General Electric Co., Ltd., and F. Clark. September 20th, 1939. (532782.)

26231. "Method of coating the interior surface of the envelopes of electric lamps." Westinghouse Electric International Co. September 29th, 1938. (532783.)

26271. "Amplifiers with negative feedback." Soc. Industrielle des Procédés Loth. September 23rd, 1938. (Cognate application, 26272/39). (532793.)

26299. "Electric cable installations." Enfield Cable Works, Ltd., and R. C. Mildner. September 21st, 1939. (532833.)

26345. "Light projectors." British Thomson-Houston Co., Ltd. September 21st, 1938. (532842.)

26353. "Electric flatirons." Westinghouse Electric International Co. October 12th, 1938. (532844.)

26356. "Snap action thermostats." G. R. Shepherd (Westinghouse Electric International Co.). September 21st, 1939. (532845.)

26430. "Systems and apparatus for radio navigation." Standard Telephones & Cables, Ltd. October 15th, 1938. (532854.)

26501. "Locomotive vehicles." British Thomson-Houston Co., Ltd. (General Electric Co.) September 23rd, 1939. (532855.)

26530. "Electromagnets." Igranic Electric Co., Ltd., and A. Sim. September 23rd, 1939. (532905.)

26562. "Glass-to-metal seals." British Thomson-Houston Co., Ltd. September 23rd, 1938. (532907.)

26571. "Electrical switches to prevent unauthorised use of motor vehicles." H. Whittle and S. Baynes. September 25th, 1939. (532908.)

26580. "Timing means for controlling or operating a series of variable indicating, signalling, warning, or supervisory devices." S. J. Smith and Telephone Manufacturing Co., Ltd. September 25th, 1939. (532910.)

26608. "Devices for controlling the speed of a rotating body." Philips Lamps, Ltd. September 27th, 1938. (532911.)

26620. "Fittings for the doors of ovens and like hot chambers." Elexcel, Ltd., P. T. Ellis, and H. Buckley. September 25th, 1939. (532912.)

26639. "Electric therapeutic lamps." British Thomson-Houston Co., Ltd. September 27th, 1938. (532914.)

26664. "Case for housing, loading, and like apparatus in telephone transmission lines." Standard Telephones & Cables, Ltd. October 18th, 1938. (532919.)

26667. "Electron discharge apparatus." Standard Telephones & Cables, Ltd., D. S. B. Shannon and P. K. Chatterjea. September 26th, 1939. (532920.)

26687. "Devices for preventing interference with radio." Electrolux, Ltd. October 3rd, 1938. (532922.)

26711. "Piezo-electric elements." Standard Telephones & Cables, Ltd. October 19th, 1938. (532925.)

26723. "Electric lamps." I. Laurie and E. E. Laurie. September 27th, 1939. (532927).

FINANCIAL SECTION

Company News. Liquidations and Bankruptcies. Stock Exchange Activities

Reports and Dividends

English Electric Co., Ltd. In the course of his speech at the annual meeting on February 20th, Mr. G. H. Nelson (chairman) said that although the accounts again showed a substantial bank overdraft the liquid assets had been increased to £2,918,983. In spite of higher taxation the company had earned 15 per cent. on its ordinary capital. They considered that they were justified in distributing two-thirds of this as it would enable the shareholders, to play the full part expected of them.

Mr. G. H. Nelson, chairman of the English Electric Co., Ltd.

Mr. Nelson referred to the vulnerability of the company to Excess Profits Tax and expressed the opinion that the tax in its present form was no less likely to jeopardise the stability of employment of workpeople than to diminish the income of shareholders. They would continue to work for the removal of anomalies which caused the tax to be neither fair nor wise. Although at present little could be done about the future, there was every reason to believe that the sound financial and technical state of the company would enable it to find a wide field of fruitful activity in both the home and export markets.

The Power Securities Corporation, Ltd.—Presiding at the annual meeting on February 20th, Mr. G. Balfour (chairman), said that it was hardly necessary to mention that general financial business was at a standstill and that they received no interest on Italian securities from the date of the entry of Italy into the war. Apart from these matters their business during the year was fully employed.

Work completed by Balfour Beatty & Co., Ltd., last year was as great in volume as in any previous year, and they had in hand this year as large a volume of civil and electrical engineering work at home and abroad as at any time, except for one year, since the corporation was incorporated, and this work was of a normal character and was in addition to a large volume of purely war work which they did not regard as ordinary profit-earning business. Notwithstanding prevailing conditions their work in Iraq was well ahead of their time schedule on the large works in course of construction in that country.

The Yorkshire Electric Power Co.—Presiding at the annual meeting on February 17th, Sir Robert G. Ellis (chairman) said that with the suspension of the electricity rationing scheme in December 1939, and with the gradual overcoming of black-out difficulties, there had been an increased demand for electricity. This had been reflected mainly in the company's output in bulk to the associated company, Electrical Distribution of Yorkshire, Ltd., and to other authorised undertakers. To ensure continuity of supply they had linked up their system with the systems of other public and private owners of generating plant. Arrangements also had been made with other authorised undertakers in their area for the giving of mutual aid in men and materials so that damage sustained might be made good with the least delay. Their generating plant capacity was being increased and they would readily absorb the increase.

The London Power Co.—Presiding at the annual meeting on February 17th, Mr. G. Balfour (chairman) said that the company was playing its part in the national effort. All supplies had been satisfactorily maintained during the year.

The total revenue for 1940 amounted to £4,370,812, an increase of £314,402, as compared with 1939. Expenses include generation, £2,163,320, maintenance, etc., £180,251, transmission £29,795, rents and rates £260,124, and management £70,367. Debenture interest takes £781,095, allocation to constituent companies' sinking fund £32,552, sinking fund "A" £109,910, interest £86,264, sinking fund "B" £479,739, and interest £174,394. The dividend is again 6 per cent.

Mather & Platt, Ltd.—Speaking at last Monday's annual meeting Mr. L. E. Mather (chairman) said that still further provision had to be made for losses incurred through the over-running of territory by the enemy. This and increased expenditure on A.R.P. work and taxation had reduced the profit, although it was £13,000 above that of the preceding year.

He could not refer in detail to the company's present activities but he assured the shareholders that the balance sheet showed a strong position. Their textile machinery business had been reduced but its place had been taken by a variety of other machinery including electrical.

The Lancashire United Transport & Power Co., reports a gross revenue for 1940 of £426,500, and a net revenue of £138,741 (against £112,246 for 1939). The final ordinary dividend is 6 per cent. again making 10 per cent. for the year.

Clarke, Chapman & Co. report a net trading profit for 1940 of £122,468, an increase of £12,499 as compared with the preceding year. After providing for depreciation and directors' fees the net profit is £96,367, an increase of £7,257. The ordinary dividend for the year is maintained at 12½ per cent., less tax, reserve receives £20,000, staff pensions fund £5,000, and £38,632 is carried forward (against £32,155 brought in).

International Combustion, Ltd., reports a reduction in profit from £299,000 in 1938-39 to £198,677 in 1939-40. The amount set aside for taxation reserve is reduced from £135,000 to £75,000. A final dividend of 15 per cent. and a cash bonus of 10 per cent. is to be paid on the ordinary shares, making a total of 30 per cent. (against 32½ per cent. for the year).

The London Passenger Transport Board has announced a final payment on the "C" stock for 1940 at the rate of 2¼ per cent. actual, less tax, making 3 per cent. for the year. The £1.825 remaining, being less than one-eighth of 1 per cent. on "C" stock outstanding has been transferred to the "C" stock interest fund.

The Scottish Power Co. is again paying a final ordinary dividend of 5½ per cent., maintaining the distribution for the year at 8 per cent.

The County of London Electric Supply Co., Ltd., reports a net profit for 1940 of £1,192,817 as compared with £1,276,490 for 1939. It is proposed to pay a final dividend of 5 per cent., making 8 per cent., less tax, for the year (against 10½ per cent.).

The South London Electric Supply Corporation, Ltd., reports a net profit for 1940 of £52,176, as compared with £61,698 for the preceding year. The final ordinary dividend is 4 per cent., making 7 per cent., less tax, for the year (same).

The Mersey Railway Co. recommends a dividend on the consolidated ordinary stock of £1 15s. per cent., less tax, for 1940 (against £1 12s. 6d. per cent.).

The Clyde Valley Electrical Power Co., is paying a final ordinary dividend of 5 per cent., maintaining the distribution for the year at 8 per cent.

The Electrical Distribution of Yorkshire, Ltd., is again paying a final ordinary dividend of 4½ per cent., making 9 per cent. for the year (unchanged).

The Dublin United Tramways (1896), Ltd., has announced a final dividend of 3 per cent., making 4 per cent., less tax for 1940 (same).

The Mid Southern Utility Co., proposes to pay a final dividend of £2 12s. 3d. per cent., making £5 4s. 6d. per cent. (£5 19s. 6d. per cent.) on "A," £1 17s. 3d. per cent., making £3 14s. 6d. per cent. (£4 9s. 6d. per cent.) on "B" and 2½ per cent., making 5 per cent. (same) on "C" stock.

The Bagdad Light & Power Co., reports a net profit of £27,954, as compared with £26,943 in the previous year, plus £416 non-recurring profit. The final ordinary dividend is 2½ per cent., making 5 per cent., tax free, for the year (against 4½ per cent.). The balance carried forward is £8,207.

The Cables Investment Trust, Ltd. is again paying an interim ordinary dividend of 2 per cent.

The North-Eastern Electric Supply Co., Ltd., is maintaining its dividend for the year at 7 per cent., by the final payment of 4½ per cent.

Central Board's Borrowing Powers

A DRAFT Special Order made by the Electricity Commissioners empowers the Central Electricity Board to borrow up to £70,000,000; the present limit is £60,000,000. Any objections to the Order must be made by registered post to the Secretary, Electricity Commission, Savoy Court, Strand, W.C.2, and despatched on or before March 24th. At the same time a copy must be sent to the Secretary and Solicitor, Central Electricity Board, Trafalgar Buildings, 1, Charing Cross, London, S.W.1.

It is understood that the Order is to enable the Board to finance its wartime activities, including civil defence measures and the provision of supplies to new factories.

New Companies Registered

G.B.A. Electrical Ltd.—Private company. Registered February 18th. Capital £15,000. Objects: To carry on the business of manufacturers of and dealers in electrically heated blankets and electrical heating appliances, electricians, radio and electrical engineers, etc. Directors: A. R. H. Jones, 53, The Boulevard, St. Annes-on-Sea, and two others. Secretary: A. Jones. Registered office: 53, The Boulevard, Lytham St. Annes.

Betts Engineering Co., Ltd.—Private company. Registered February 17th. Capital £2,700. Objects: To acquire a business of an electrical and mechanical engineer carried on by W. M. Betts. The directors are: W. M. Betts, 15, Jubilee Court, London Road, Thornton Heath, Surrey, and N. S. Murray, The Bungalow, Coulsdon Lane, Chipstead, Surrey. Secretary: F. Ketton. Solicitors: Peard & Son, Union Bank Chambers, Katharine Street, Croydon.

H. H. (Amalgamated) Ltd.—Private company. Registered February 15th. Capital £100. Objects: To carry on the business of manufacturers of, and dealers in, electric lamps, bulbs and articles, manufacturers of valves, neon signs, ultra-violet ray apparatus, electric motors, medical instruments, etc. John C. Clarke (director of H. H. Electric, Ltd.), 16 St. Margarets Grove, E. Twickenham, is the first director. Registered office: 32, Clifton Road, Maida Vale, W.9.

Companies' Returns

Statements of Capital

Weald Electricity Supply Co., Ltd.—Capital £1,000,000 in 1,000,000 ordinary shares of £1 each. Return dated March 26th, 1940 (filed October 7th, 1940). All shares taken up. £671,000 paid (£1 per share on 346,000 and 10s. per share on 650,000). £4,000 considered as paid on 4,000 shares. Mortgages and charges: Nil.

A. Anderson & Son (Electrical Engineers), Ltd.—Capital £3,000 in 3,000 shares of £1 each. Return dated June 12th, 1940. All shares taken up. £3,000 paid. Mortgages and charges: Nil.

Barlows Weston Electric Lighting Co., Ltd.—Capital £500 in 500 shares of £1 each. Return dated June 13th, 1940. All shares taken up. £4 paid. £496 considered as paid. Mortgages and charges: Nil.

Wholesale Electro (Halifax), Ltd.—Capital £4,000 in £1 shares. Return dated August 9th, 1940. All shares taken up. £4,000 paid. Mortgages and charges: Nil.

Electric Resistance Furnace Co., Ltd.—Capital £5,000 in 5,000 shares of £1 each. Return dated August 26th, 1940. All shares taken up. £5,000 paid. Mortgages and charges: Nil.

Mortgages and Charges

Electrical Equipments (Cardiff), Ltd.—Mortgage on moneys due under a contract, dated January 29th, to secure all moneys due or to become due from the company to Barclays Bank, Ltd.

Bill Switchgear, Ltd.—Satisfaction to the extent of £1,000, on January 16th, of legal charge dated January 25th, 1937, and registered August 19th, 1939.

Grove Battery Works, Ltd.—Mortgage, on the company's undertaking and property, present and future, including uncalled capital, dated January 24th, to secure £2,361 3s. 7d. and further advances. Holders: J. M. Wotherspoon & Co., Ltd., 194, Bishopsgate, E.C.

Radiovisor Parent, Ltd.—Further charge, on the company's land and premises, with machinery and plant, and its undertaking and other property, present and future, dated January 27th, 1941, to secure all moneys due or to become due from the company to British Mutual Banking Co., Ltd., Ludgate Circus, E.C., not exceeding £4,000 (inclusive of £3,500 secured by deeds dated March 16th, 1939, and July 18th, 1940).

Receivers Appointed and Released

Kniveton Cable Works, Ltd.—Frank E. Langhelt, Sterling Works, Dagenham, ceased to act as receiver on February 10th, 1941.

Amplilux Lighting & Illumination Co., Ltd.—G. M. Bottome, C.A., 12 Grosvenor Gardens, S.W.1., was appointed receiver and manager on July 4th, 1940, under powers contained in debentures dated March 17th, 1939. (Notice filed February 13th, 1941.)

Bankruptcies

C. F. A. Henckel, trading as Dawson & Henckel, electrical dealers, 42, Gray's Inn Road, W.C.—A sitting of the London Bankruptcy Court was appointed to be held on February 20th before Mr. Registrar Kean for the public examination of this debtor, who petitioned the Court last October with total liabilities of £5,275 (unsecured, £3,775), and net assets, £1,112. Debtor attributed his insolvency to loss of trade arising as a consequence of the outbreak of war, and to bad debts. The Official Receiver reported that the debtor was unable to attend the Court at present as he was in hospital, and the examination was adjourned generally.

E. C. Johnson & J. A. Sheward (Edstan Electric), electrical contractors, 20, Market Street, Hanley, Stoke-on-Trent, and 40, London Road, Newcastle-under-Lyme.—Application for discharge to be heard on March 20th, at the Town Hall, Hanley.

J. F. Creasey, electrical engineer, trading as Positive Electric Co., 673, Romford Road, Manor Park, E., 6a, the Parade, Wanstead Park, and 92, Katherine Road, East Ham.—Discharge suspended for eighteen months until July 15th, 1942.

J. K. Thornborough & E. C. Thornborough (J. K. Thornborough & Co.), Crescent Road, Windermere.—Last day for receiving proofs for dividend March 4th. Trustee, Mr. W. G. Pearson, 16, Cornwallis Street, Barrow-in-Furness, Official Receiver.

H. W. Slater, mechanical and electrical engineer, trading as the Engineering Supplies Co., 24, Grey Street, Newcastle-upon-Tyne.—Last day for receiving proofs for dividend March 4th. Trustee, Mr. P. J. McLellan, Gibb Chambers, Westgate Road, Newcastle upon-Tyne, Official Receiver.

J. S. Griffin, electrical engineer, 108, High Town Road, Luton.—First and final dividend of 2s. 11½d. in the £, payable at 6, The Parade, Northampton.

Winding-up Petition

Architectural Constructional & Electrical Utilities, Ltd.—In the Companies Court, Chancery Division, last week, Mr. Justice Simonds had before him a petition for the compulsory winding up of this company.

Counsel for the petitioners said it was a judgment creditor's petition for £867; leave to proceed was given, but an execution was abortive.

Counsel for the company asked that the petition should stand over for a week so that the company could put an attractive proposal before the petitioner.

His Lordship pointed out that this was a case in which there had been four previous petitions to wind up the company.

Counsel for the company said they had paid up under those petitions.

His Lordship directed the petition to stand over for one week.

Supervising Electrical Engineers

ABOUT 300 members and guests of the Association of Supervising Electrical Engineers were present at the luncheon held on February 22nd at the Connaught Rooms, W.C. In proposing the toast of "The Electrical Industry," Sir Cyril Hurcomb (Chairman, Electricity Commission) referred to the proved value of the flexibility of public electricity supply in the war. Thus, the grid had been of inestimable advantage in allowing a wide freedom of choice in the location of new factories, while the rapid increase in the electrical demands in some districts owing to the dispersal of population had been adequately met. That would surely influence public opinion in such places in favour of electrical methods after the war. There was no doubt that supply engineers had done a great deal to alleviate hardships of people in bombed areas.

Touching upon the electrical equipment of ships, including "degaussing," Sir Cyril (who is also Director-General of Shipping) expressed the view that no war service was of greater value than expediting the movements of vessels and their cargoes. The materially helpful attitude shown by undertakings in pooling resources and spreading costs of protective measures against enemy action augured well for joint action after the war in organising the industry. The Central Electricity Board certainly had had no reason to regret the steps it took more than two years ago to provide against air attack.

Responding, Mr. J. R. Beard (President, Institution of Electrical Engineers and immediate Past-President of the A.S.E.E.) paid a tribute to the contribution of "light-current" engineers to the war effort, much of which could not be spoken of at present. Power engineers had played an important part in enabling our cities to withstand pounding by the enemy. Installation work in new factories had been more than enough to balance the loss of ordinary work. Fullest advantage, he believed, could be taken of the experience of electrical engineers if they were used as an organised body rather than as individuals. Mr. Beard concluded by adverting to the suggestion in his I.E.E. presidential address that electrical engineers might well consider post-war organisation of the industry as a recreation from the more urgent work of the moment.

The health of "The Guests" was proposed by Mr. H. W. Swann (President, A.S.E.E.). Among them, he said, were to be found all branches of engineering. Adaptability was a measure of an engineer's usefulness and this was illustrated by the work of the members of the Association in devising temporary expedients for bombed factories. He then referred briefly to the principal guests who included, apart from the speakers, Col. A. W. Garrett (Chief Inspector of Factories), Sir Noel Ashbridge (Chief Engineer, B.B.C.), Mr. B. Handley (President, I.M.E.A.), Mr. H. T. Young (National Employment Register), Col. Sir Thomas Purves (Director, C.M.A.), Mr. P. V. Hunter (National Register of Electrical Installation Contractors), Mr. W. J. Jones (Director, E.L.M.A.) and Mr. H. Winstanley. Mr. A. C. Cramb (Director, E.D.A.) was unavoidably absent. In addition, Mr. Swann mentioned the following past-presidents of the Association who were present:—Messrs. S. B. Donkin, A. H. Dykes, F. Gill, J. S. Highfield, Harold Hobson and J. M. Kennedy.

Response was made briefly by Sir Leopold Savile (President, Institution of Civil Engineers), who indicated agreement with Sir Cyril Hurcomb as to the need for the standardisation of voltages and tariffs, adding that uniformity in such matters as to whether a switch was "on" when it was "up" or "down" was also desirable from the point of view of the consumer.

STOCKS AND SHARES

TUESDAY EVENING.

THE Budget, still some weeks ahead, is already beginning to cast its shadow before—so far, that is to say, as Stock Exchange values are affected. The purely gilt-edged stocks remain very firm. Central Electricity 3¼ per cent. stock, for instance, at 89 is 10s. higher. The declared policy of the Government in declining to pay more than 3 per cent. for war borrowing, suffices to keep quotations of gilt-edged securities on their previously high plane, and nothing in the war news has happened to disturb the confidence of security holders. The principal interest in stocks and shares, for the time being, has shifted to the Home Railway market, the dividends for 1940 being well up to expectations and, in some cases, exceeding previous estimates.

Something of a lull is noticeable in the industrial sections. On balance, prices are easier than they were a week ago. A sign of the times is the announcement by the Bristol Tramways Company of the dividend of 8 per cent. being paid this time less tax, instead of tax free. The price of the shares has fallen 3s. 9d. as a result. Business throughout the markets is on a limited scale.

Pleasant Surprises

The Home Railway companies surprised and gratified their stockholders by declaring dividends more generous than most proprietors had expected. The Southern Railway is paying, as it was thought likely to do, the full 5 per cent. on its preferred stock (which has hardened at 49½) and 1¼ per cent. on the deferred. These are the same rates as those of a year ago, but as to whether the deferred dividend would be maintained this time, advance estimates had been a little doubtful. The London Passenger Transport Board did better than was anticipated. By declaring 2¼ per cent. on the " C " stock, the Board brings up the dividend for 1940 to 3 per cent. This raises the yield on the stock, at 34 cum dividend, to over 8¾ per cent. on the money. High though the yield, it is less than that afforded by other junior stocks in the Home Railway group. Public interest accordingly fastens upon those that pay best upon money invested in them at present prices.

The dividend declarations have had the effect of galvanising interest in Home Railway stocks as a whole. Supporters of the market contend that the boards of directors would have pursued a more conservative dividend policy if they attached importance to the apprehensions respecting possible claims for higher wages, and the likelihood of the Government agreement being drastically altered to the companies' detriment.

London Power Company

The London Power Company did very well in 1940, the accounts showing a substantial increase in the total revenue. The company supplies the Metropolitan Electric, the London Electric, the Notting Hill Electric and Central London Electricity, Ltd. The share capital is £50,000, carrying a fixed dividend of 6 per cent., these shares being owned by the four companies just mentioned. In these shares there is, of course, no market, but the company's four debenture stocks are quoted, and one—the 5 per cent.—is given weekly in our lists. The present price is 104½. The 5 per cent. debenture stock is redeemable at 100 through the operation of a sinking fund which started in 1927. Out of the originally-issued amount of £17,000,000, rather more than £4½ million has been repaid. The other three debenture stocks are dated 1952/72; on each the interest is payable on January and July 1st. The 4 per cent. debenture stock stands at 103½; the 3¼ per cent. stock at 84½; and the 3½ per cent. issue at 94½. Business is taking place on these bases, but the stocks are easier to sell than they are to buy. Redemption in each case is at 100.

County of London

The County of London Company's final dividend for 1940, making 8 per cent. for the year, goes against 10½ per cent. in the preceding period, an announcement which came as something of an unwelcome surprise. While a reduction had been generally looked for, it was thought that the dividend would be 9 per cent. for the year. The effect of the declaration was a fall of no more than 1s. 3d. per share, this witnessing to the confidence which the shareholders of the company feel in the strength of their undertaking and the likelihood of a return to increased distribution when times improve.

London Electric Supply

The provincial electricity supply companies are maintaining their previously-paid dividends, and this is in accordance with market anticipations quoted here from time to time during the past few weeks. The London Electric Supply Corporation has also maintained its dividend of 7 per cent.; a good result, considering the adverse circumstances which have conspired against the profit-earning capacities of the London companies. The Corporation operates in a London area which includes districts known to have suffered from the effects of air raids, and the 7 per cent. dividend is, therefore, the more satisfactory on this account. London Electrics are $\frac{1}{16}$ better at 22s. 6d.

Price Fluctuations

After what had come to be an almost regular weekly recital of rises in quotations it is something of a change to have contrary movements to report. Apart from County of London Electric and London Electric Supply, the ordinary shares in the Home electricity section are unaltered. The provincial companies continue to attract attention and the firmness of their prices is quite as real as it is apparent. In the Colonial list, Victoria Falls Power ordinary are $\frac{1}{16}$ harder at 73s. 9d., within a florin of the highest reached last year. The yield, at the present rate of dividend, 15 per cent., is $4\frac{1}{16}$ per cent. on the money. Tokyo Electric sixes at 39½ are a point down, owing, of course, to the political developments in the Far East. Cable and Wireless stocks are uninteresting. Oriental Telephones are $\frac{1}{16}$ up, at $2\frac{7}{16}$, the attraction being that the dividends are ordinarily paid free of tax. In the manufacturing and equipment group, falls have occurred in Automatic Telephones, Callender's, Johnson & Phillips, British Insulated, Murex and British Aluminium. Hopkinsons eased off to 38s. 9d. Mather & Platt at 37s. 6d. ex dividend have recovered the dividend deduction.

E.P.T. Dangers

The chairman of the English Electric Company, speaking at the annual meeting last week, drew the Government's special attention to the fact that the Excess Profits Tax in its present form is no less likely to jeopardise the stability of employment of workpeople than it is to diminish the income of shareholders. He told the shareholders that the company is fully occupied, but that he could give no detailed account of its activities. There is every reason to believe that a company of this kind, with a long history of technical knowledge and skilled craftsmanship, will be able to find a wide field of fruitful activity after the war, both in the home and export markets.

Record Business

On the same day, at the meeting of the Power Securities Corporation, Mr. George Balfour, J.P., M.P., stated that the company had in hand this year as large a volume of civil and electrical engineering work at home and abroad as at any time, except for one year, since the company was incorporated. This, he added, is in addition to a " very large volume of purely war work such as we do not regard as ordinary profit-earning business." The gross profit of the year showed a reduction, as already mentioned, of £39,500. No interest had been received on the Italian securities in which the company is interested, from the date of the entry of Italy into the war. The price of the shares remains at 15s. ex dividend.

Dividends and E.P.T.

In framing dividend decisions at the present time, one factor that directors are obliged to bear in mind is the difficulty—amounting often to the impossibility—of raising more capital for development work. As if the 100 per cent. E.P.T. is not sufficient obstacle to expansion and enterprise, a ban is placed upon the issue of fresh capital. In rare cases exceptions are made, but they are few and far between. Consequently a company is saddled with the necessity of providing out of revenue, money for expansion that, in normal circumstances, would be charged to capital and provided by an offer of stock or shares. The brunt of this wartime development falls, of course, upon the holders of ordinary shares, and the profits that would accrue to them. Hints are thrown out that the forthcoming Budget may contain a relaxation of E.P.T. Eighty per cent. is rumoured as a possible alternative to the present 100 per cent. The Chancellor of the Exchequer has given a plain warning of the need for an increase of taxation to meet the war bill, so if he eases the E.P.T. strain, he will probably make up for it by tightening the financial fetters in some other direction.

ELECTRICAL COMPANIES' SHARES

Prices, Dividends and Yields

Company	1940 High-est	1940 Low-est	Dividend Pre-vious	Dividend Last	Middle Price Feb. 24	Rise or Fall	Yield £ s. d.
Home Electricity Companies							
Bournemouth and Poole	63/6	36/6	15	15	47/6	..	—
British Power and Light	30/-	20/-	7	7	26/6	..	5 3 8
City of London	28/-	20/-	7½	7½	21/3	..	—
Clyde Valley	38/6	24/-	8	8	35/-	..	4 11 5
County of London	43/3	21/-	10½	8	31/3	−⅛	5 2 5
Edmundson's:							
7% Pref.	32/-	24/3	7	7	28/3	..	4 19 1
Ord.	27/6	18/6	9	6	24/6	..	4 18 0
Elec. Dis. Yorkshire	40/3	32/-	9	9	36/3	..	4 19 4
Elec. Fin. and Securities	42/-	34/6	12½	12½	40/-	..	6 5 0
Elec. Supply Corporation	48/-	39/-	12	11½	37/-	..	6 4 4
Isle of Thanet	16/-	5/6	4	4	6/-	..	—
Lancs Light and Power	33/-	21/6	7½	7½	28/9	..	5 4 4
Llanelly Elec.	21/-	17/-	5½	5½	20/-	..	5 10 0
Lond. Assoc. Electric	21/-	12/6	7	5½	13/9	..	—
London Electric	35/-	19/-	7	7	22/6	+⅛	6 4 5
London Power Deb. Red	105½	100	5	5	104½	..	4 15 6
Metropolitan	41/6	22/6	12	10	33/9	..	5 18 6
Midland Counties	39/-	23/3	8	8	33/9	..	4 14 10
Mid. Elec. Power	40/-	29/6	9	9	33/9	..	5 6 8
Newcastle Elec.	29/9	22/6	7	7	25/-	..	5 12 0
North Eastern Elec.:							
Ordinary	31/6	16/6	7	7	27/-	..	5 3 9
7% Pref.	32/6	25/6	7	7	30/-	..	4 13 4
Northampton	44/-	38/-	10	10	40/-	..	5 0 0
Notting Hill 6% Pref. (£10)	10½	9	6	6	8½	..	—
Northmet Power:							
Ordinary	42/3	22/6	10	10	32/6	..	—
6% Pref.	29/-	23/-	6	6	28/-	..	4 5 9
Richmond Elec.	24/6	18/-	7	6	18/9	..	—
Scottish Power	38/-	24/-	8	8	34/6	..	4 12 9
Southern Areas	21/3	12/9	5	5	16/3	..	6 3 1
South London	23/3	20/-	7	7	20/-	..	7 0 0
West Devon	20/-	17/6	5	5	20/-	..	5 0 0
West Glos.	22/-	15/-	2½	4½	16/3	..	5 10 10
Yorkshire Elec.	40/-	23/6	8	8	35/9	..	4 9 5
Overseas Electricity Companies							
Atlas Elec.	4/-	1/3	Nil	Nil	2/-	..	—
Calcutta Elec.	37/-	22/6	10*	8*	35/-	..	4 11 5
Cawnpore Elec.	30/-	24/-	10	10	27/6	..	7 5 6
East African Power	25/6	19/6	7	7	25/-	..	5 12 0
Jerusalem Elec.	24/-	15/-	7	7	21/3	..	6 11 9
Kalgoorlie (10/-)	12/6	9/6	7½	7½	12/-	..	6 5 0
Madras	26/9	21/6	8*	6*	25/-	..	—
Montreal Power	35½	30	1½	1½	29½	..	—
Palestine Elec. "A"	25/-	10/-	5*	Nil	20/-	..	—
Perak Hydro-electric	20/3	13/-	2½	6	17/-	..	7 1 2
Shawinigan Power	27½	19	83cts.	90cts.	18½	..	—
Tokyo Elec. 6%	69	30	6	6	39½	−1	15 11 0
Victoria Falls Power	75/9	56/6	15	15	73/9	+⅛	4 1 4
Whitehall Investments Pref.	17/9	8/-	7½	7½	14/6	..	10 6 10
Public Boards							
Central Electricity							
1950-70	110½	104	5	5	109	..	4 11 9
1955-75	112½	106	5	5	112	..	4 9 3
1951-73	107½	102	4½	4½	107	..	4 4 0
1963-93	96½	90	3½	3½	95	..	3 13 6
1974-94	91	79½	3½	3½	89	+½	3 13 0
London Elec. Trans. Ltd.	92	87½	2½	2½	93	..	2 15 9
London & Home Counties							
1955-75	113½	105	4½	4½	105½	..	4 5 4
Lond. Passenger Transport							
A	116	104	4½	4½	111½	..	4 0 9
B	116	102½	5	5	106	..	4 14 4
C	65½	25	1½	3	34	..	8 16 6
West Midland Joint Elec.							
1948-68	106½	103	5	5	105½	..	4 14 9
Telegraph and Telephone							
Anglo-Am. Tel.:							
Pref.	107	85	6	6	100½	−1	5 19 3
Def.	23¾	18	1½	1½	23½	..	6 7 8
Anglo-Portuguese	22/6	10/-	8	8	15/-	..	10 13 4
Cable & Wireless:							
5½% Pref.	99¾	66	4½	5½	95½	..	5 15 2
Ord.	65	27	4	4	54	..	7 8 2
Canadian Marconi $1	6/-	4/-	Nil	4cts.	5/-	..	—
Globe Tel. & Tel.:							
Ord.	32/6	21/6	7½*	6*	27/6	..	4 7 3
Pref.	37/9	22/6	6	6	27/6	..	4 7 3
Great Northern Tel. (£10)	20	11	20	20	12½	..	—
Inter. Tel. & Tel.	5½	2½	Nil	Nil	3	..	—
Marconi-Marine	30/-	18/3	10	7½	22/6		6 13 3
Oriental Telephone Ord.	2⅞	45/-]	12*	11½*	2⅞	+⅛	4 14 3
Telephone Props.	15/-	11/-	6	6	11/3	..	10 13 4
Telephone Rentals (5/-)	9/6	5/3	10	10	7/3	..	18 0

Company	1940 High-est	1940 Low-est	Dividend Pre-vious	Dividend Last	Middle Price Feb. 24	Rise or Fall	Yield £ s. d.
Traction and Transport							
Anglo. Arg. Trans:							
First. Pref. (£5)	4/3	1/-	Nil	Nil	2/-	..	—
4% Inc.	11½	2	Nil	Nil	6½	..	—
British Electric Traction:							
Def. Ord.	830	400	5	45	800	..	5 12 6
Pref. Ord.	169	130	8	8	150	..	5 6 8
Bristol Trams	48/6	32/6	8*	8	35/-	−⅛	4 11 5
Brazil Traction	12½	5½	$1	50c.	7	..	—
Calcutta Trams	24/-	16/3	8	5½	19/-	..	5 15 8
Cape Elec. Trams	18/6	16/-	5	5	17/-	..	5 17 4
Lancs Transport	35/-	27/6	10	10	35/-xd.	+9d.	5 14 3
Mexican Light:							
1st Bonds	36	25	5	5	35	..	—
Rio 5% Bonds	95	74	5	5	85	..	5 17 8
Southern Rly.:							
5% Prefd.	79	35	5	5	49½	+1	10 2 0
5% Pref.	104½	59	5	5	87	..	5 15 0
T. Tilling	45/9	29/-	10	10	41/3xd.	+⅛	4 17 0
Tilling & B.A.	47/6	41/9	9*	8*	44/6	..	—
West Riding	35/-	25/-	10	10	35/-	+6d.	5 14 3
Equipment and Manufacturing							
Aron Electricity Ord.	17/6	10/-	15	Nil	16/-	..	—
Assoc. Elec.							
Ord.	43/3	26/6	10	10	40/-	..	5 0 0
Pref.	36/6	32/3	8	8	35/-	..	4 11 5
Automatic Telephone & El.	47/3	32/-	12½	12½	43/9	−½	5 14 1
Babcock & Wilcox	50/-	28/6	10	11	40/9	−6d.	5 7 9
British Aluminium Ord.	56/-	29/-	12½	12½	41/3	−9d.	—
British Insulated Ord.	92/6	67/-	20	20	81/3	−½	4 18 6
British Thermostat (5/-)	14/9	6/6	18½	18½	11/3	..	8 4 6
British Vacuum Cleaner (5/-)	12/-	4/9	40	12½	6/3	..	10 0 0
Brush Ord.	4/6	1/9	Nil	Nil	4/-	..	—
Callender's	69/-	46/-	15	15	62/6	−⅛	4 16 0
Chloride Elec. Storage	72/6	55/-	15	15	62/6	..	4 16 0
Consolidated Signal	72/6	59/-	36½	17	65/-	..	5 4 7
Crabtree (10/-)	24/9	17/6	17½	17½	22/6	..	7 15 7
Crompton Parkinson:							
Ord. (5/-)	20/-	12/-	30	20	18/9	..	5 6 8
E. K. Cole (5/-)	5/-	2/6	10	Nil	4/-	−6d.	—
Elec. & Musical Industries (10/-)	10/3	4/3	5	Nil	7/6	−3d.	—
Electric Construction	36/3	27/6	13½	10	27/6	..	7 5 6
Enfield Cable Ord.	56/-	40/6	25	16½	50/-	..	6 10 0
Electrical Switchgear (10/-)	22/6	20/-	16	10	20/-	..	5 0 0
English Electric	33/9	16/6	10	10	30/-	..	6 13 4
Ensign Lamps (5/-)	15/3	12/6	25	25	15/-	..	8 6 3
Ericsson Tel. (5/-)	39/3	23/-	25*	25*	32/6	..	—
Ever Ready (5/-)	28/3	16/6	30	40	26/-	−6d.	7 14 0
Falk Stadelmann	18/3	12/6	6	7	14/6	..	9 13 2
Ferranti Pref.	25/-	22/-	7	7	25/-	..	5 12 0
G.E.C.:							
Pref.	32/6	26/-	6½	6½	32/6	..	4 0 0
Ord.	83/3	53/3	20	20	78/9	..	5 1 6
Greenwood & Batley	25/6	20/-	15	13	20/-	..	13 0 0
Hall Telephone (10/-)	18/6	8/9	15	10	11/3	..	8 18 0
Henley's (5/-)	21/6	12/6	20	20	20/-	..	5 0 0
4½% Pref.	21/2	20/6	4½	4½	21/3	..	4 4 8
Hopkinsons	46/9	32/6	15	15	38/9	−9d.	7 14 8
India-Rubber Pref.	21/-	19/6	5½	5½	21/3	..	5 3 6
Intl. Combustion	121/3	70/-	32½	30	41xd.	..	6 13 4
J. Lucas	60/6	40/-	15	15	55/-	..	5 9 1
Johnson & Phillips	50/9	32/6	12½	15	45/-	−⅛	6 13 4
Lancashire Dynamo	59/9	47/6	25	20	52/6	..	7 12 4
Laurence Scott (5/-)	11/-	6/-	15	15	7/-	..	10 14 2
London Elec. Wire	25/6	20/-	7½	7½	22/6	..	6 13 4
Mather & Platt	46/6	30/-	13½	10	37/6xd.	+1/-	5 6 8
Metropolitan Elec. Cable Pf.	22/-	21/3	5½	5½	21/3	..	5 3 6
Murex	86/9	52/6	20	20	76/3	−½	5 5 0
Pye Deferred (5/-)	9/-	6/9	25	25	10/-	..	14 5 8
Revo (10/-)	20/9	11/6	17½	5	20/-	..	2 10 0
Revrolle	60/6	41/-	12½	12½	50/-	..	5 0 0
Siemens Ord.	23/9	15/6	7½	7½	20/-	..	7 10 0
Strand Elec. (5/-)	2/3	9d.	4	2	1/9	..	5 14 4
S. Smith (1/-)	8/-	3/6	37½	50	7/6	..	6 13 4
Switchgear & Cowans (5/-)	11/9	5/6	20	10	8/9	..	5 14 3
Telegraph Condenser (10/-)	8/9	6/3	5	..	7/6	..	—
Telegraph Construction	42/6	29/-	10	10	36/3	..	5 10 6
Telephone Mfg. (5/-)	9/-	5/-	9	9	7/-	..	6 8 7
Tube Investments	96/9	59/-	23¾	23¾	90/-	..	5 5 9
Vactric (5/-)	3/6	2/-	4	Nil	2/3	..	—
Vickers (10/-)	22/-	9/6	10	10	14/9	..	6 15 7
Ward & Goldstone (5/-)	19/6	12/6	20	20	13/9	..	7 5 6
Westinghouse Brake	46/-	30/6	17½	10	41/3	..	4 17 0
Walsall Conduits (4/-)	26/6	17/6	55	55	26/3	..	8 7 8
West, Allen	7/-	3/-	7½	10	3/9	..	10 0 0

*Dividends are paid free of Income Tax.

CONTRACT INFORMATION

Tenders Invited and Accepted. Schemes Promising Electrical Work

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses. Further details of items marked with an asterisk can be obtained from the Department of Overseas Trade (Inquiry Room), Millbank, Westminster, London, S.W.1.

Brierfield.—March 13th. Electricity Department. 300 - kVA transformer, also 6,600-V metalclad switchgear. (February 21st.)

Burnley.—March 7th. Electricity Department. E.h.v. switchgear, transformers, e.h.v. cables, fuse pillars and boxes. (February 21st.)

Bury.—March 17th. Electricity Department. Five 625-kVA transformers. (See this issue.)

Edinburgh.—March 11th. Electricity Department. Link disconnecting boxes. (See this issue.)

Glasgow. — March 8th. Corporation Libraries Department. Installation of lifts at the extension of Mitchell Library. Forms, &c., from Office of Public Works, Room 81, City Chambers (£2 2s.); tenders to Town Clerk.

Keighley.—March 13th. Electricity Department. Motors, starters and high-voltage overhead line work. (See this issue.)

Kingston - upon - Thames. — March 10th. Borough Council. Eight centrifugal pumping sets with accessories. Conditions of contract and specification from John Taylor & Sons, Council's engineers, Caxton House, Tothill Street, Westminster, S.W.1. (Deposit: £2 2s.).

Morecambe & Heysham. — March 14th. Electricity Department. 6,000 kVA and 400 kVA indoor-type transformers. (February 21st.)

South Africa.—PRETORIA.—March 26th. City Council. Switchgear, transformers, reactors and auxiliary apparatus. (February 14th.)

March 20th. V.i.r. cable, lead covered and armoured cable and electrolier wire. (T.15848/41.)*

April 2nd. City Council. Pipework equipment for the power station. (February 21st.)

PORT ELIZABETH.—March 13th. Municipality. One battery-driven tower wagon and one battery-driven van. (T.15013/41.)*

Electric lamps and cable conduit. (T.15014/41.)*

CAPE TOWN.—March 31st. Electricity Department. 2,000 fuses. (T.15821/41.)* Ironclad service cut-outs. (T.15820/41.)*

Southern Rhodesia.—SALISBURY.—March 10th. City Electricity Department. 374 meters of various types. (T. 23645/40.)* Material for electrical distribution. (T.Y.15136/41.)*

Stores Department. March 28th. Electrically driven rendering vessel, etc., for municipal abattoir. (T.15135/41.)*

Tredegar.—March 6th. U.D.C. Surveyor's and Electricity Department. Stores. (February 14th.)

Wolverhampton.—March 17th. Electricity Department. Paper insulated cables, compound and compounded insulating tapes. (February 7th.)

Orders Placed

Bedford.—Electricity Committee. Contract renewals recommended for various periods:—Cookers—Jackson Electric Stove Co.; Revo Electric Co. Meters—Metropolitan-Vickers Electrical Co.; Chamberlain & Hookham; Venner Time Switches. House service fuses—Henley's. Water heaters—Johnson and Phillips. Cooker control units—H. W. Holland. Cables—Siemens Bros. & Co. Lamps—Cryselco.

Lichfield.—Electricity Committee. Accepted. Extension of cables for supply to Packington Hall (£350).—Gibbs Cables, Ltd.

Middlesbrough.—Town Council. Accepted. Three 250-kVA transformers (£573)—Electric Construction Co. Cable (£150)—Britannic Cable Co.

Salford.—Light, Heat and Power Committee. Accepted. Repairs to power station chimneys (£800).—Babcock and Wilcox.

Stockton-on-Tees.—Town Council. Accepted. Installation of an electric lift at the Corporation warehouse (£682)—Pickerings.

Swansea.—Electricity Committee. Accepted. Inter-departmental telephone system (£21 for installation and £15 a quarter rental for five years)—Telephone Rentals.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Abergele.—Works of water supply, including service reservoir, plant, etc., for U.D.C.; Sandford, Fawcett & Partners, consulting engineers, Maple Lodge Farm, Maple Cross, Rickmansworth, Herts.

Accrington.—Proposed development of sites for houses, for T.C.; H. Sanderson, borough surveyor, Town Hall.

Community kitchens and feeding centres for T.C.; borough surveyor.

Ashton-under-Lyne.—Community feeding and municipal restaurant, St. Michael's Square, for T.C.; A. T. Kemp, borough surveyor, Town Hall.

Atherton.—Communal feeding and kitchen centre for U.D.C.; F. L. Boydell, surveyor, Town Hall.

(Continued on next page)

Safety of Workers

DURING 1939, the number of fatal accidents in the 284,000 premises under the Factory Department of the Ministry of Labour and National Service increased by 17 per cent. and of non-fatal accidents (those causing more than three days' disablement) by 7 per cent. In his Annual Report (Stationery Office, 1s. net) the Chief Inspector, Col. A. W. Garrett expresses the view that the rise in the non-fatal category is not greater than the number of man-hours worked. Illustrating the effect of war conditions he shows that for the last six months of peace, fatalities increased by 7 per cent. and for the first six months of war, ending February, 1940, by 42 per cent. over corresponding periods in the previous twelve months. Many of these were due to persons falling through asbestos roof sheeting in the rush to get black-out done and in the erection of new factories. Equivalent figures for non-fatal accidents were 9 and 13 per cent. There has, however, been a decrease of 2 per cent. in the total number of accidents involving young persons.

Altogether 1,104 persons were involved in fatal and 192,371 in non-fatal accidents; 1,038 of the former and 145,379 of the latter were adult males. Of the total, 587 (including 29 fatal) are attributed to electricity. In electrical engineering works reportable accidents accounted for 9 deaths and 6,374 injuries; of these 54 were due to electrical causes, which were also responsible for 84 of the 1,189 accidents (15 fatal) in generating stations.

Four cases of lead poisoning (none fatal) occurred in accumulator works, a figure only one-third of the average of the three preceding years. Manufacture and repair of electric meters are lumped together with thermometers and barometers in regard to mercurial poisoning, five cases of which are noted. Voluntarily reported instances of dermatitis amounted to 2,952, of which 61 were in electrical engineering works.

Avoidable loss of life and personal injury in connection with travelling cranes were consequences of non-observance of precautions required by the Factory Acts; often the crane driver was not warned that men were at work on or near his track. Where the use of adequate fixed screens for hydraulic presses for moulding plastics is impracticable, the guard should be interlocked with the operating mechanism. With the co-operation of the British Plastics Federation, detailed specifications of guards for different types of machines have been prepared, but in the present circumstances it has not been possible to give effect to them fully.

After the outbreak of war, the Senior Electrical Inspector, Mr. H. W. Swann, and certain of his staff undertook a great deal of additional special work on lighting problems in connection with outside work in docks, shipyards and buildings under construction and in advising various Government Departments on wartime electrical problems.

Much assistance has also been received from the British Standards Institution in promoting safety in many directions. Reference is made to the Fifth Report of the Departmental Committee on Lighting in Factories, the recommendations of which now have statutory force, and to the pamphlet issued on "Factory Ventilation in the Black-Out." Although the Home Office Industrial Museum is now closed to ordinary visitors, parties are admitted by appointment.

Barking.—Building, Jenkins Lane; Gross, Sherwood & Heald, Ltd.

Office building, River Road; F. McNeil & Co., Ltd., Russell Square, W.C.1.

Vehicle maintenance depot (£2,800), for T.C.; borough engineer, Town Hall.

Barnsley.—Foundry additions; Wilson & Longbottom, Ltd.

Birmingham. — Works, Aldridge Road School and King's Norton School, including heating and lighting, for E.C.; H. J. Manzoni, city engineer, Council House.

Blackley.—Fire station and works extensions; Imperial Chemical Industries, Ltd. Hexagon House.

Bolton.—Alterations to "Travellers' Rest", Market Street, Farnworth; Magee Marshall & Co., Ltd., Crown Brewery.

Bosley.—Alterations, "Harrington Arms" Hotel, for P. Yates & Sons, Ltd.; F. C. Sheldon, architect, King Edward Street, Macclesfield.

Brentwood.—Conversion, Somerset Hall, into feeding centre, for U.D.C.; D. A. Dallas, surveyor, Ingrave Road.

Bromyard (Salop).—Cottages, Heathfields Cradley, for R.D.C.; T. S. Watts, architect, New Road.

Chepstow.—Alterations, etc., at Regent's House, for Monmouthshire P.A.C.; C. L. Jones, Queen's Hill, Newport.

Chesterfield.—Alterations to property known as "Rye Flatt," Oakwell Avenue, for E.C.; Arthur Heath, builder, Old Road, Brampton.

Chorlton.—Fish restaurant, 197, Clarendon Road, Whalley Range; Jas. Duckworth, 35, Badminton Road.

Cleveland (North Riding).—Electric heating and lighting for school shelters; J. W. White, county architect, County Hall, Northallerton.

Corby.—Additional houses, Oakley Road, for U.D.C.; Gotch, Saunders & Surridge, architects, High Street, Kettering.

Crickhowell.—Proposed fire station, for R.D.C.; surveyor, Rural Council Offices.

Darlington.—Alterations, "Slaters Arms", Bondgate, for the West Auckland Brewery Co., Ltd.; D. Crawford, architect, Newgate Street, Bishop Auckland.

East Ham.—Adaptation of Brindles Corner, Shenfield, as boys' remand home, with equipment, for T.C.; borough engineer, Public Offices, Town Hall, E.6.

Egremont.—Houses (100), Gully Flatts, for Ennerdale R.D.C; surveyor, The Flosh, Cleator Moor.

Ennerdale.—Houses (100); R.D.C. surveyor.

Fareham.—Report centre (£1,300); and additional office accommodation, for U.D.C.; H. A. Watts, clerk, Westbury Manor.

Flixton.—School, Assembly Hall, for Parish Church Council; Rev. H. G. G. Herklots, The Vicarage.

Frimley and Camberley.—Sewage disposal works extensions (£5,000), for U.D.C.; Alan Bradley, clerk, Municpal Buildings, London Road, Camberley.

Gawsworth.—Houses (12), Woodhouse Lane, for Macclesfield R.D.C.; J. H. Walters, architect, 19, Moody Street, Congleton.

Glossop.—Factory; J. Hadfield Barratt & Co., Ltd., athletic clothiers, 17, Altrincham Street, Ardwick, Manchester.

Harwich.—Conversion of St. Nicholas Hall, Bathside, for community kitchen and feeding centre, for T.C.; Borough Surveyor's Office.

Heckmondwike.—Fire station for U.D.C.; A. Idle & Son, builders, 2, Green Avenue, Chapel Lane.

Huddersfield.—Domestic science department, Meltham Methodist Schools, for West Riding E.C.; H. Wormald, county education architect, County Hall, Wakefield.

Hull.—Community cafés and kitchens for T.C.; A. Rankine, city architect, Guildhall.

Hurley.—Additions and alterations, Old Bell Hotel; G. Trapani.

Kidderminster.—Community feeding and kitchen centres for T.C.; J. Hawcroft, borough surveyor, Mill Street.

Extensions to laundry, Clarence Street; United Co-operative Laundries Association, Clarence Street.

Kirkham.—Conversion of Fylde Institution to emergency hospital for Lancashire C.C.; S. Wilkinson, county architect, County Offices, Preston.

Lancashire.—Electrical installation work, including the re-wiring of laundry machinery, etc., at institutions and hospitals for C.C. (£5,535); S. Wilkinson, county architect, County Offices, Preston.

Electrical installations in all communal shelters accommodating 24 persons and over, for C.C.; S. Wilkinson, county architect, County Offices, Preston.

Leeds.—Development of industrial zone, for T.C.; W. S. Cameron, city engineer, Civic Hall.

Completion of 2,000 municipal dwellings, for T.C.; W. S. Cameron, city engineer.

Lichfield.—Infectious diseases hospital, Wissage, for Staffs C.C.; K. L. Murray, county architect, County Buildings, Stafford.

Linton (Cambs.).—Structural alterations to the "Green Hill", for Greene, King & Sons, Ltd., brewers, The Brewery, Bury St. Edmunds.

Liverpool.—Rebuilding old "St. George", Green Lane; Peter Walker & Son, Warrington & Burton, Ltd., 105, Duke Street.

Macclesfield.—Houses (12), Woodhouse Lane; Macclesfield R.D.C.

Magherafelt.—Alterations to institution (£7,378), for Board of Guardians; clerk, Council Chambers, Magherafelt.

Manchester.—Installing tubular heaters, food conveyors, X-ray set, wiring and replacement of fittings at hospitals, etc., for Public Health Committee (£4,040); G. Noel Hill, city architect, Town Hall.

Middleton.—School canteen and community feeding and kitchen centres, for T.C.; J. Pollard, borough architect, Town Hall.

Newcastle-on-Tyne.—Alterations and improvements, Nag's Head Hotel, for Clennel & Armstrong; C. Moxon, 3, Regent Street, South Barnsley.

Premises, The Close, for E. W. Younger, Ltd., 86, The Quayside.

Newcastle-under-Lyme. — Central fire station additions, and conversion of drill hall, Silverdale, into feeding centre, for T.C.; A. Cotton, borough surveyor, Municipal Buildings.

Newton Abbot.—Hospital extensions, for the Joint Hospital Board.

Northallerton.—Electric heating and lighting installations at school shelters, for the North Riding E.C. (£6,622); J. R. White, county architect, County Buildings.

Northenden.—Works extensions; G. P. A. (Tools and Gauges), Ltd., Harper Road.

North Riding.—Electric heating and lighting at school shelters, for C.C.; J. W. White, county architect, County Hall, Northallerton.

Romiley.—Alterations, Grey Horse Inn; T. Buckley, resident architect, Gartside's Brookside Brewery Co., Limited, Ashton-under-Lyne.

Rotherham.—Works canteen, Sheffield Road; Steel, Peech & Tozer, Ltd., Ickles Works.

Rudheath.—Alterations, Farmers' Arms Hotel, for Greenall, Whitley & Co., Ltd., Wilderspool Brewery, Warrington; Powles & King, architects, Winnington Street, Northwich.

Seaton Valley.—Extensions to the sewage disposal works, for U.D.C.; Taylor & Wallin, engineers, Lansdowne Terrace East, Gosforth, Newcastle-on-Tyne.

Sheffield.—Houses, for Housing Committee; city engineer, Town Hall.

Smethwick.—Depot additions (£1,023); J. Harper & Son, Ltd.

Southport.—Alterations, Grand and Scala cinemas, Lord Street; Brockhouse Engineering, Ltd.

Sunderland.—Nine community feeding centres (£5,184); and erection of stores, Farrington Street, for Electricity Department; G. S. McIntire, town clerk, Town Hall.

Swansea.—Stores, &c., Pottery Road; Swansea Oil & Grease Co.

Emergency Hospital, Maesygwernen; Ministry of Health.

Warehouse, 65 Tycoch Road, Sketty; Mr. F. Hughes.

Swinton and Pendlebury.—Completion of houses on The Croft and Knowles Square Housing Sites, Pendlebury, for T.C.; A. Cordwell, borough surveyor, Town Hall.

Wellingborough.—10 flat roofed houses, Orlingbury, for R.D.C.; surveyor, Council Offices, 18, Oxford Street.

West Hartlepool.—Hotel, Serpentine Road, for J. W. Cameron & Co., Ltd.; J. G. Cowe & Son, architects, Central Chambers, Chester-le-Street.

Worksop.—Fire station for R.D.C.; W. Flint, engineer and surveyor, Council Offices, Carlton Road.

The Machining of Aluminium Alloys

OWING to the vast expansion in aircraft production and the consequent increase in the number of firms concerned with the machining of aluminium alloys, the Research and Development Department of the Northern Aluminium Co., Ltd., is issuing a new series of brochures conveying information on subjects connected with their products. The first of these just issued deals exhaustively with problems which have achieved considerable prominence as a result of the great drive for increased production of machined light-alloy products.

A high speed of working is a well recognised feature of aluminium alloys, and some appreciable space has been devoted to a review of the relevant properties, including the Brinell number, the high coefficient of friction of aluminium on steel, high thermal conductivity, high expansibility and relatively low notch strength, all of which are of importance in determining the machining characteristics of aluminium alloys. Alloys of high silicon content receive special attention, particularly with regard to the use of tools tipped with cemented carbides to obtain a high finish. The possibilities of obtaining with such alloys an accurate degree of high finish with diamond tools is also discussed.

The characteristics peculiar to low-tensile and high-tensile alloys are dealt with in detail, as are also the cutting materials available, the functions of the various types of cutting fluids, and chip formation and behaviour. The latter part of the bulletin is devoted to a review of cutting tools.

HONEST INJUN?

The "barker" at the Fair-booth—the quack "medicine man"—the very nature of their wares demands much outward show. One takes their wiles, cajolery, and beating of drums at their face value, but the sterner necessities of life have to be considered more soberly—even with increasing criticism.

HEATRAE may be considered one of the sterner necessities, and it stands on its own merits.

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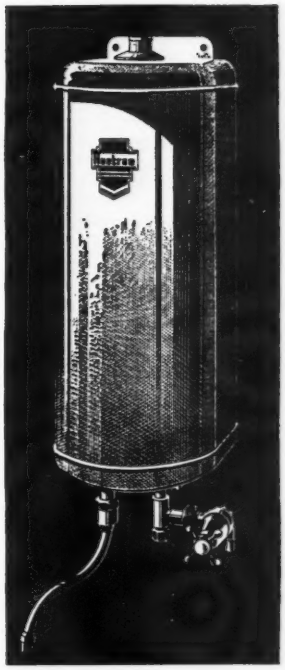

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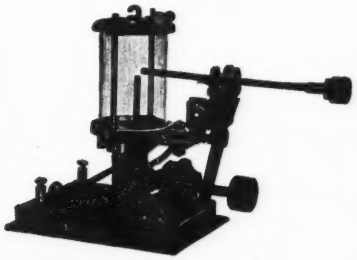

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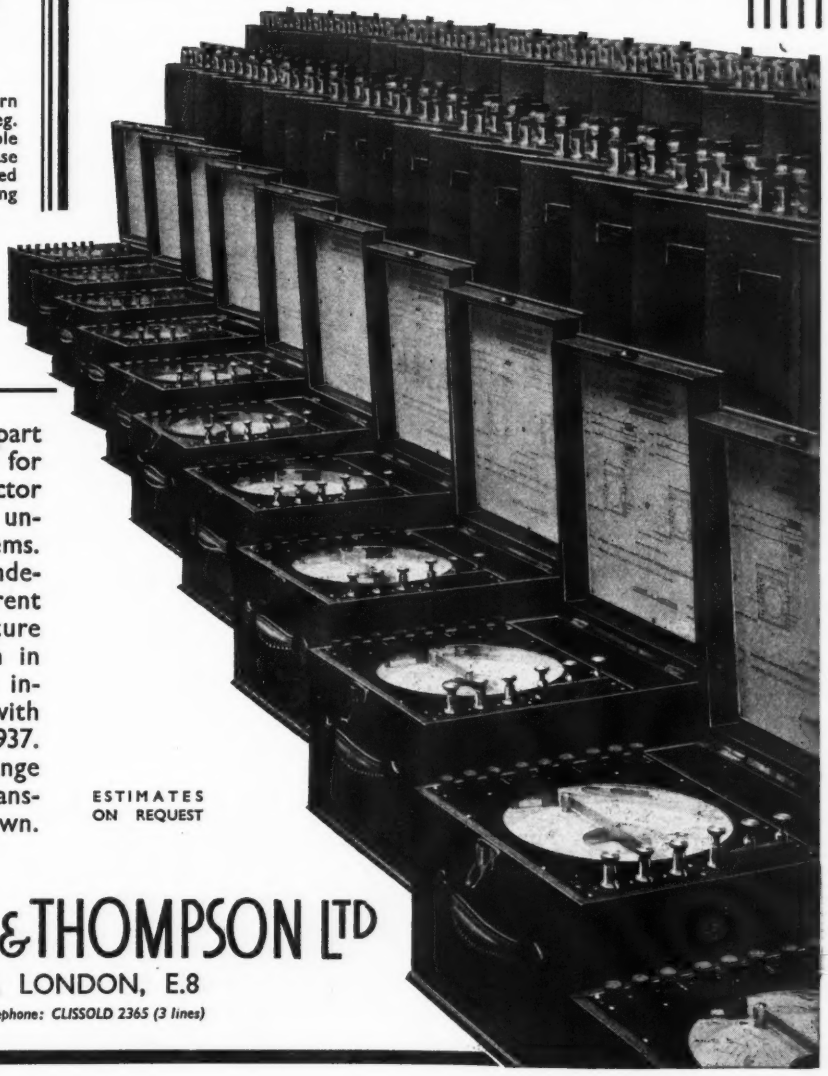
When instruments are required for balanced load systems they can be arranged to operate from one current transformer if desired.
Nalder-Lipman Patents.



Photograph shows part of a recent order for Portable Power Factor Meters for 3-phase unbalanced load systems. The readings are independent of current voltage and temperature variations met with in practice, and every instrument complies with B.S.Specification89-1937. Nalder's Multi-range Portable Current Transformers are also shown.

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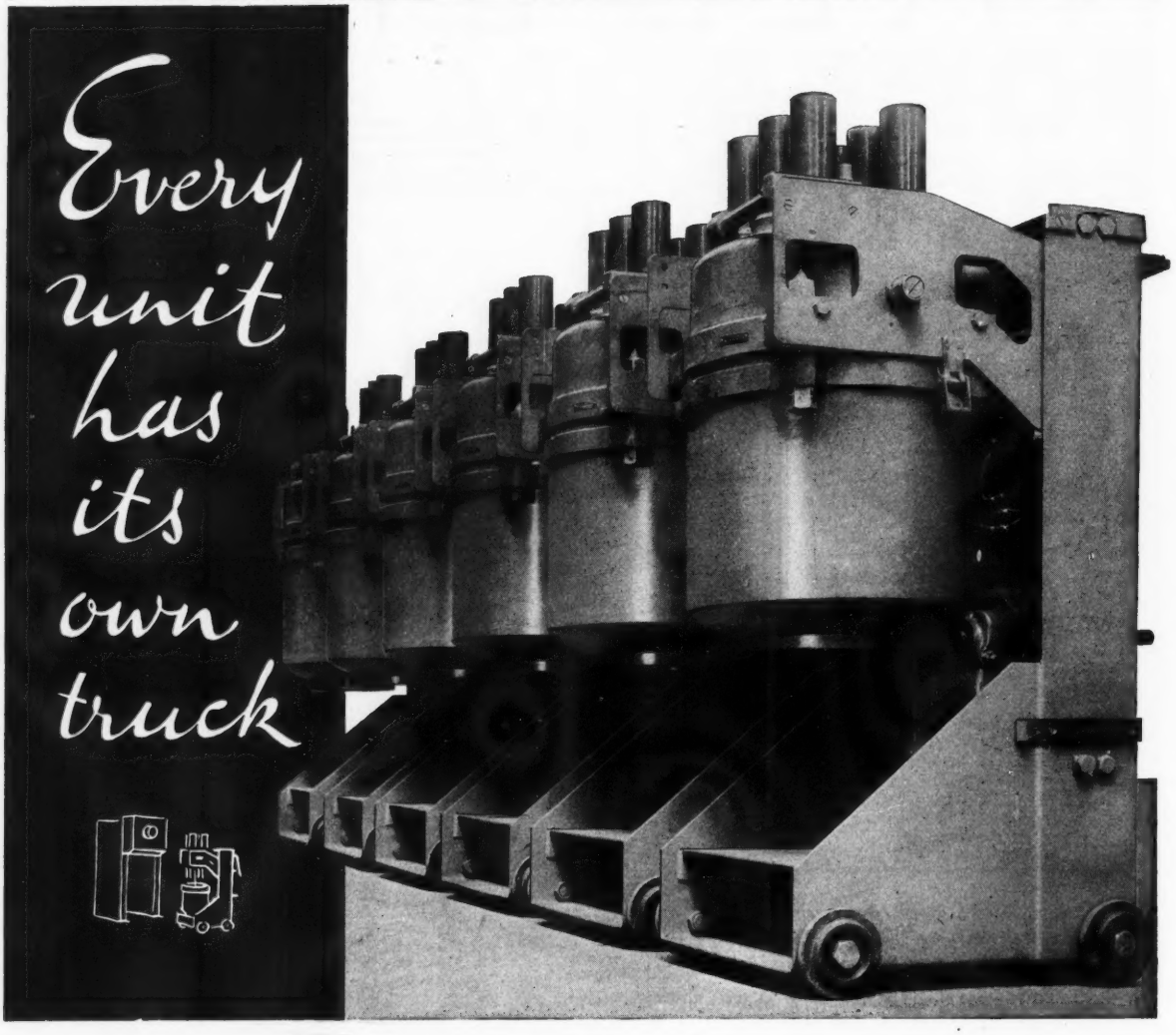
Every unit has its own truck



Every Ferguson, Pailin light metalclad unit is self contained, possessing its own truck with an integral raising and lowering mechanism for the circuit breaker. It is therefore a very simple and speedy process to isolate any breaker from the busbars, withdraw from housing and inspect the contacts.

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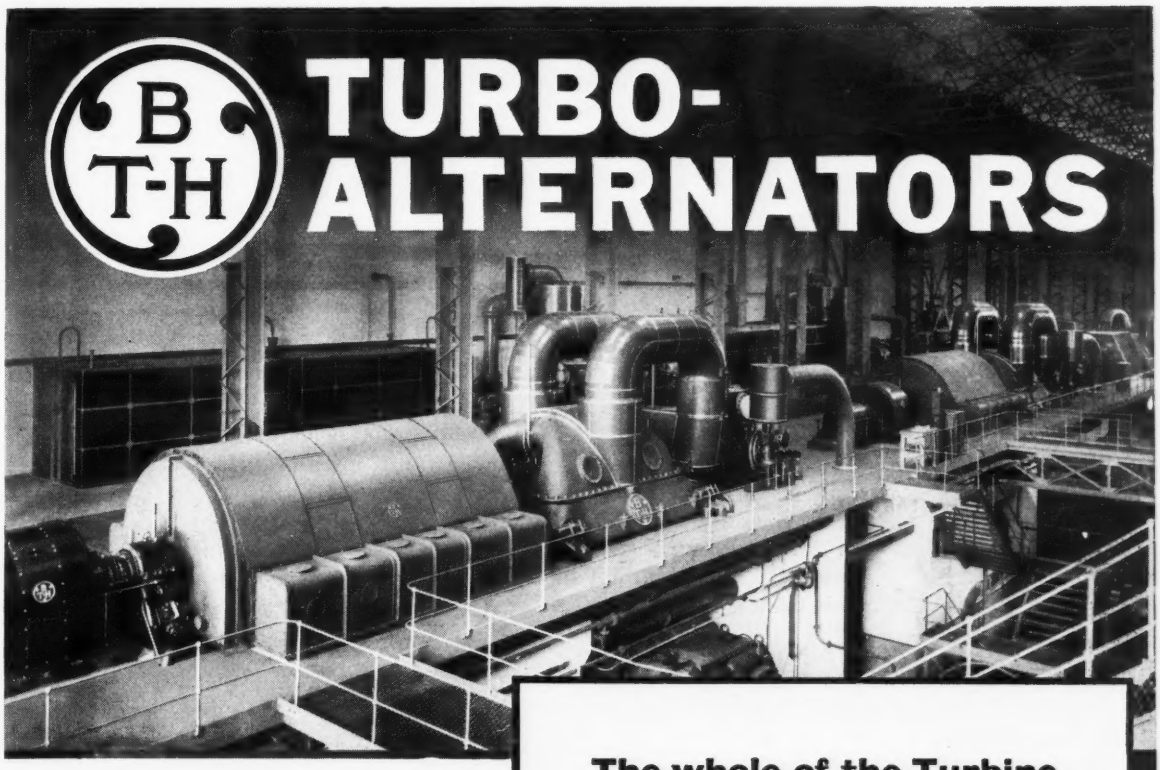

B T-H TURBO-ALTERNATORS

B T H products include heavy electric plant; rectifiers; switchgear; transformers; industrial motors and control gear; industrial heating equipment; Fabroil pinions; Mazda, Mercra, and Sodra lamps; industrial, public and A.R.P. lighting; photo-electric; electron tube, and **many other devices.**

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Two – 20,000 KW., 6,600 volt,

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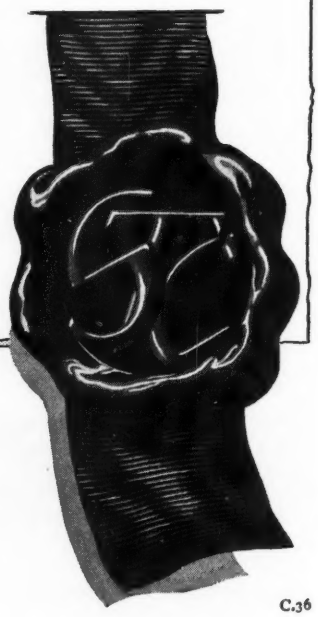

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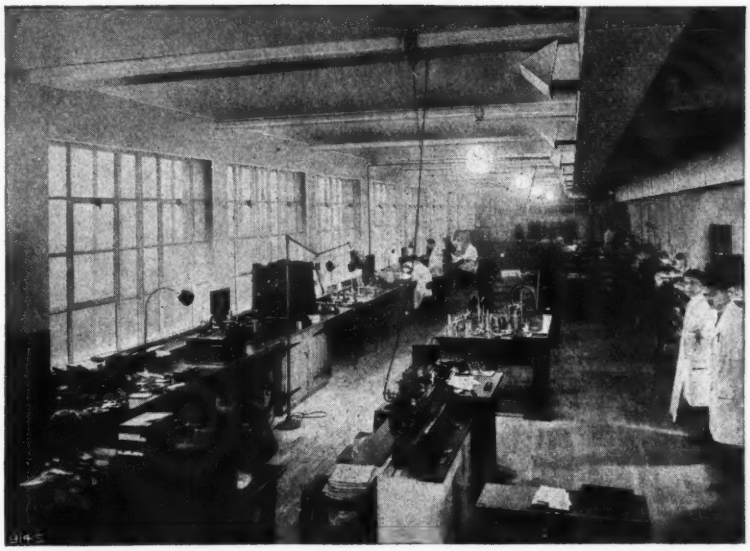

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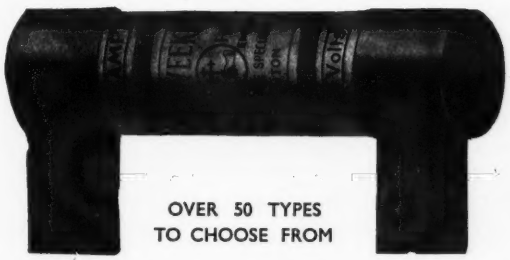

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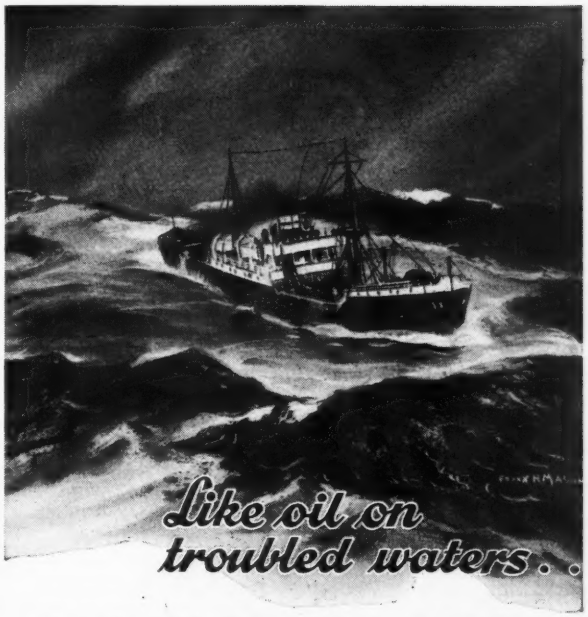

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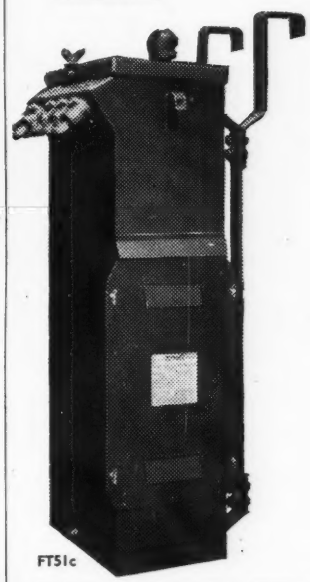

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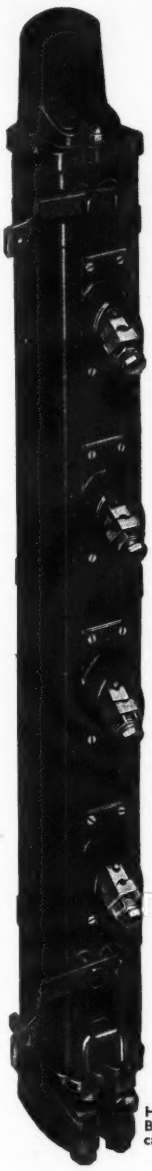

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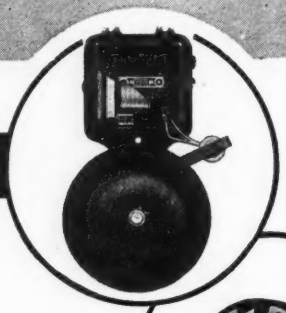

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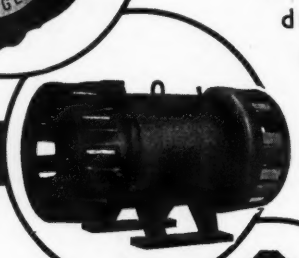

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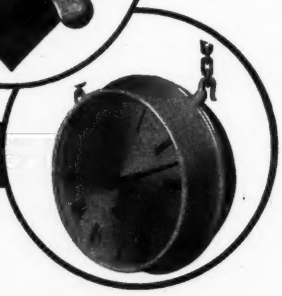

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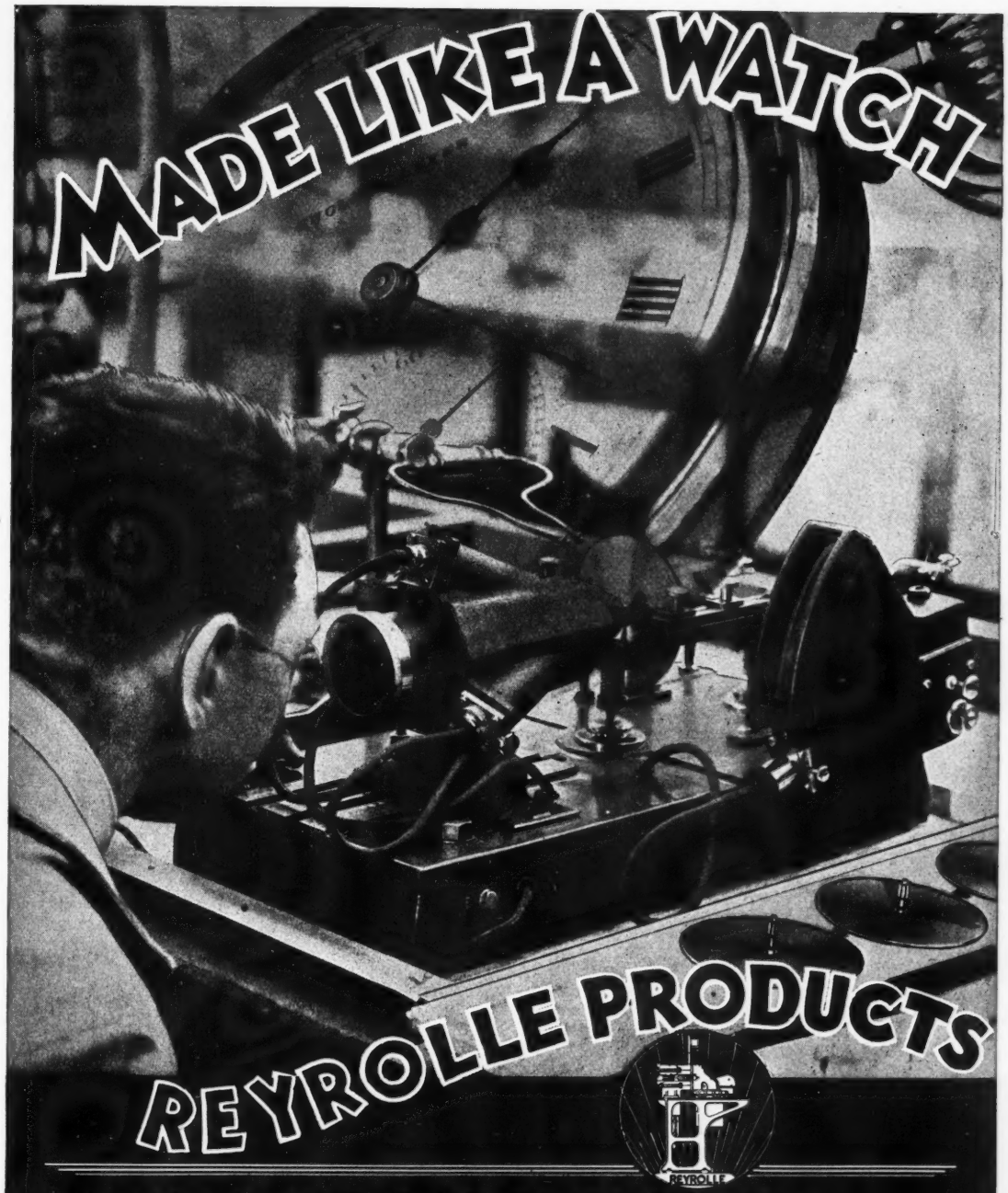

This picture happens to illustrate a process in the manufacture of relays by Reyrolle — the dynamic balancing of discs as one of the items necessary for absolute accuracy. But it is typical of all the activities of the Reyrolle organisation, which are directed to ensure that every one of its products — switchgear and all the rest — is perfect in all its parts and at all stages of its manufacture, so that in the assembled form in which it is received by the customer and put into service it is unsurpassable in the quality of its performance.

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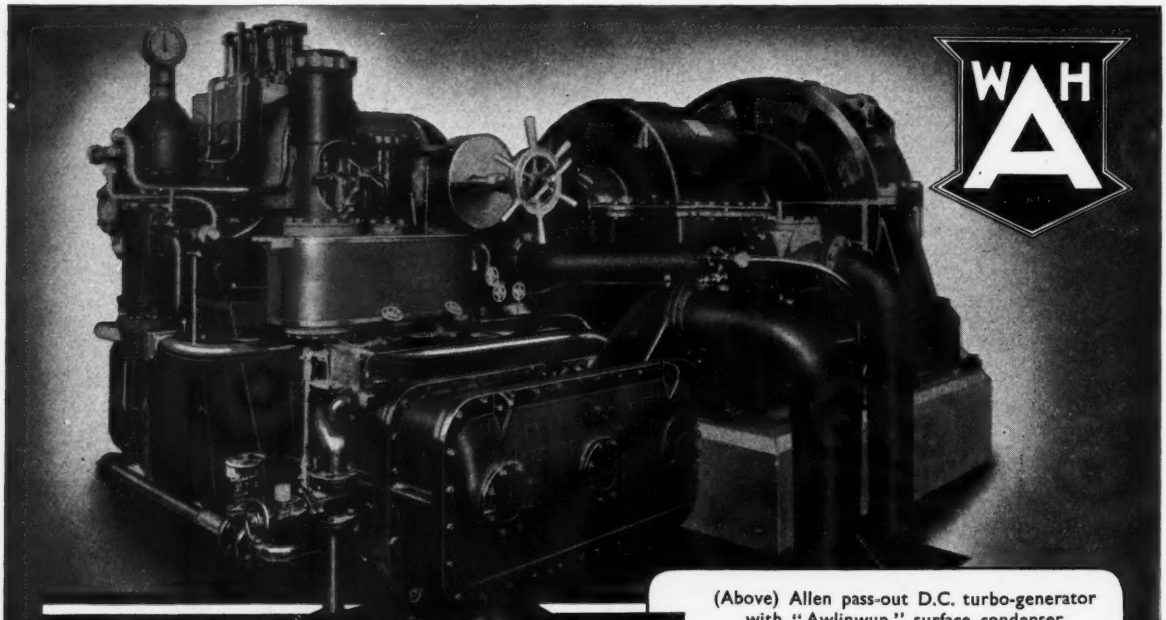

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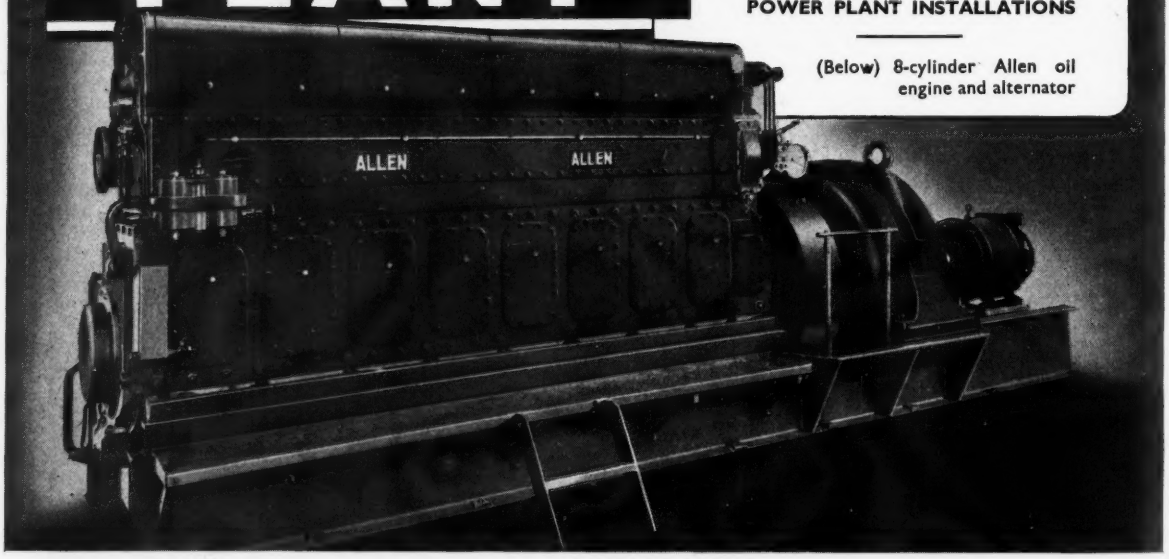
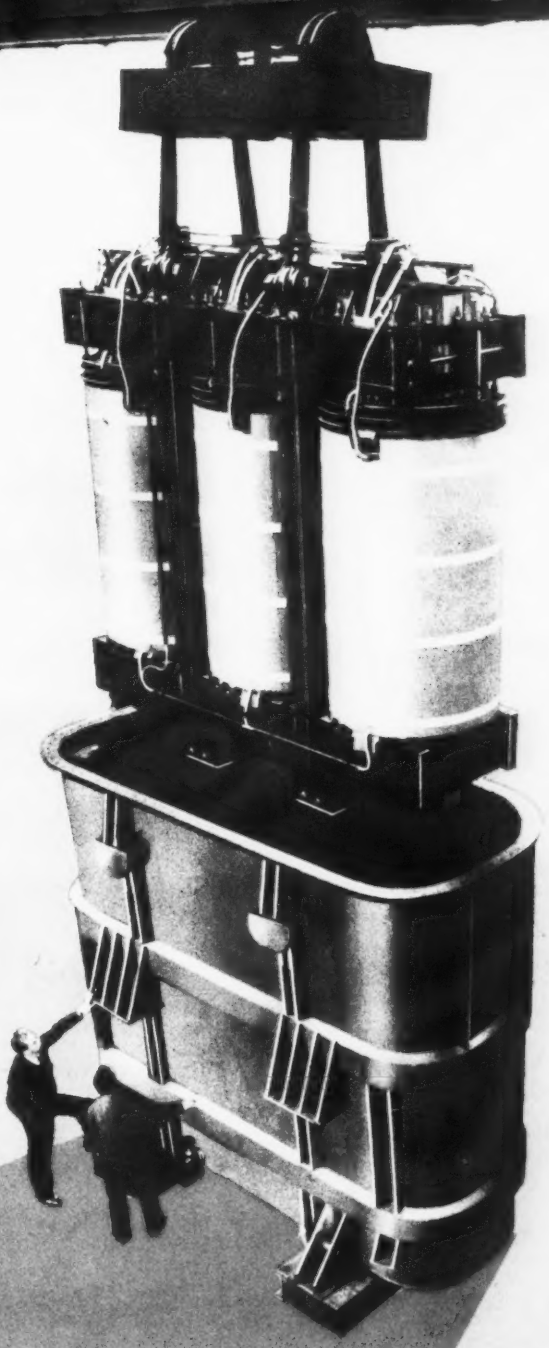
(Below) 8-cylinder Allen oil engine and alternator



W. H. ALLEN, SONS & Co. LTD.

TELEGRAMS PUMP, BEDFORD | BEDFORD, ENGLAND. | TELEPHONE BEDFORD 2201

45 years' specialisation has given B.E.T. the leadership in transformer technique

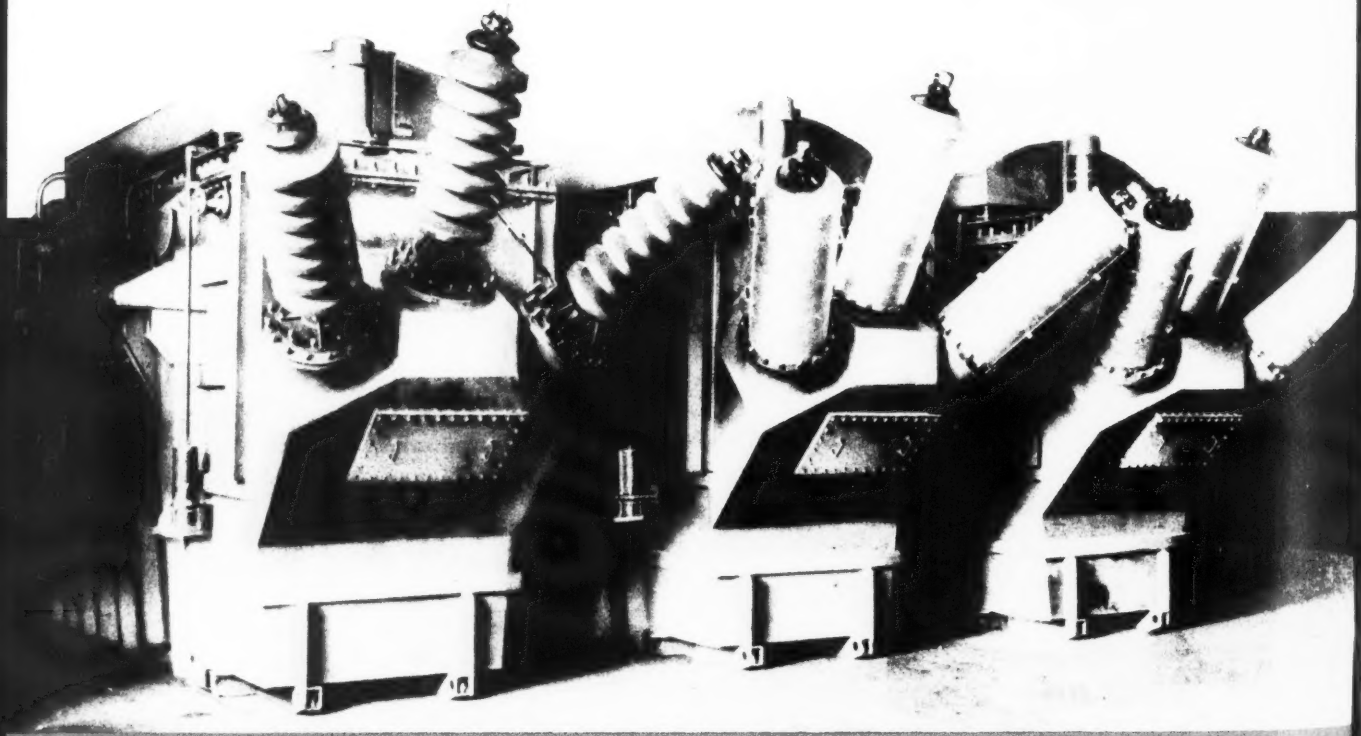


THE BRITISH ELECTRIC TRANSFORMER CO. LTD.

BRITAIN'S BIGGEST BUILDERS of ELECTRIC TRANSFORMERS

MILLIONS OF kVA OF B.E.T. TRANSFORMERS GIVING FAITHFUL SERVICE

Extreme dependability in service has brought a demand for B.E.T. Transformers that for 45 years has exceeded any other make. This dependability has grown out of experience that is unique in quality as well as quantity. The C.E.B. has placed orders for 2,500,000 kVA of B.E.T. Transformers.



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Hayes, Middlesex

in association with

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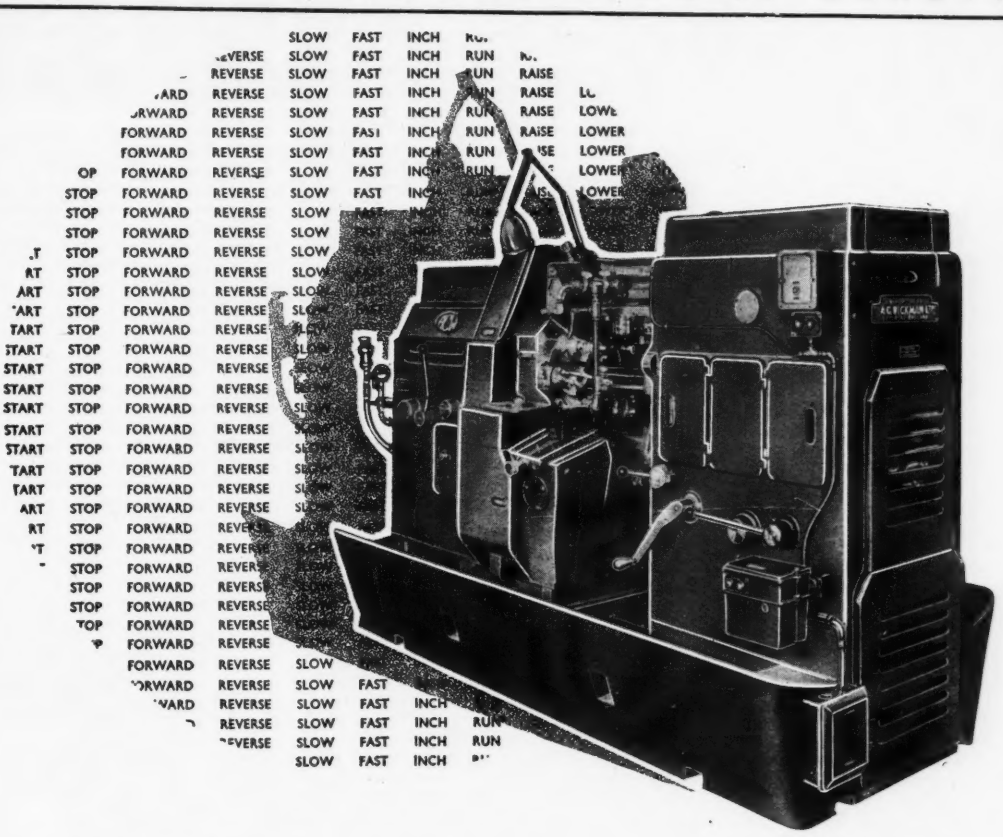
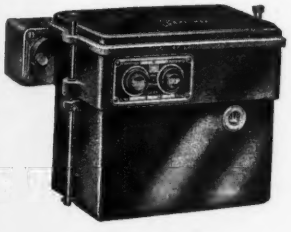
PROTECTIVE CONTROL GEAR BY CRABTREE



A. C. Wickman Ltd.

One of the many developments which have taken place during recent years in the design of machine tools is the simplification of control. This is exemplified in the Wickman 5-Spindle Automatic both by the adjustment and operative devices and by the selection of Crabtree control gear. This gear, of course, provides a highly efficient finger-tip means of controlling electrical power.



The 5-Spindle Automatic illustrated above is manufactured by Messrs. A. C. Wickman, Ltd., of Coventry. It gives maximum production from minimum frame size and is extremely economical for the production of small quantities of components. Interesting features of this machine include non-adjustable factory set clutches on both feed and high speed motions, indexing by accelerated Geneva motion, automatic centralised lubrication and a patented feed mechanism, which eliminates the need to change cams in order to effect changes in feed lengths of tools.

CRABTREE

A name synonymous with Progress in Accessories and Switchgear

C

C.510/61. Advt. of J. A. Crabtree & Co., Ltd., Walsall, England

SLUICE VALVES

BLAKEBOROUGH valves and fittings are renowned for all classes of work, but perhaps the most famous of all our specialities is the sluice valve. We have supplied actually millions of these during our long experience, and can offer an outstanding job in design, materials and workmanship. Our patterns range from small types of 2" bore (we do not refer now to straightway valves, which are available in smaller diameters) up to large units of 8 ft. diameter and above, with direct manual, manual geared, hydraulic pressure cylinder, compressed air, hydraulic or electric motor operation; in the latter class alone—electrical operation—we have well over a thousand installations to date, which places us easily at the head of this important field. Appropriate standard strengths are stocked for all regular requirements, and special patterns exist for a wide variety of conditions outside that range. Details and prices will be furnished on receipt of particulars.

Above: 72 in. Blakeborough electrically operated sluice valve.

Right: 54 in. Blakeborough hydraulically operated and manual geared sluice valves.

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J. BLAKEBOROUGH & SONS LTD. · BRIGHOUSE · ENGLAND

A London Power Station Battery of 252 cells, not originally of Alton Manufacture, now completely re-plated by Alton

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BATTERIES OF MERIT

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★ *This list is an imposing one, though by no means complete, of important installations where ALTON plates have been used in the re-plating of Cells not originally of Alton manufacture:—*

THE ALTON BATTERY COMPANY LIMITED *(Incorporating Fuller Accumulator Co. (1926) Ltd.)*

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Telephone Alton 2267 and 2268 · *Telegrams* 'Battery, Alton'

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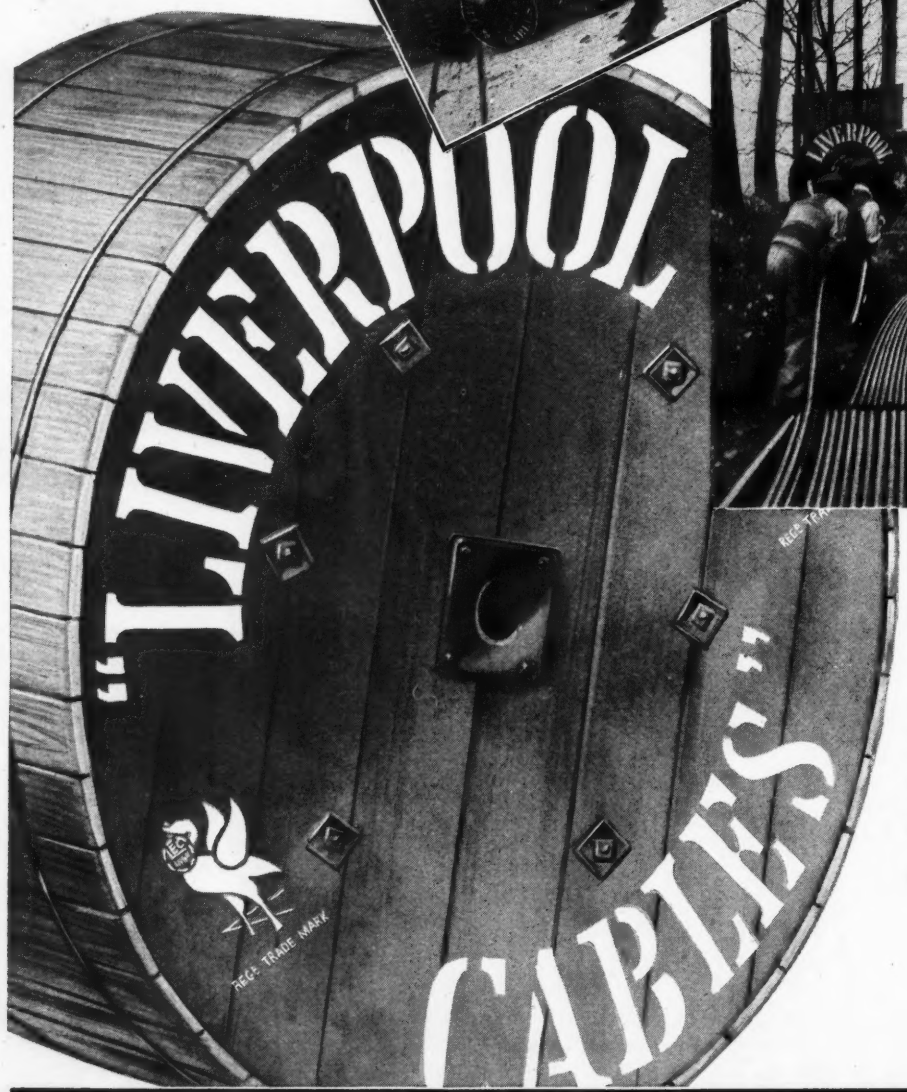

IN THE "MAIN"— SUCCESSFUL INSTALLATIONS depend on

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THE LIVERPOOL ELECTRIC CABLE COMPANY LIMITED Linacre Lane. Bootle. LIVERPOOL.

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PASS THROUGH AIR-RAIDS UNHARMED

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This is not an isolated case, and the information which we now have on the effects of concussion and vibration entirely confirms all our previous statements that our bulbs would not be affected by the explosion of bombs even a short distance away.

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They need a good light— they'll ask for CROMPTON LAMPS

People all over the country have seen and remembered these Crompton advertisements in the national press—the sales curve proves it!

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CROMPTON LAMPS

Registered Trade Mark

for GOOD LIGHT *and better sales*

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Notice

THROUGH CIRCUMSTANCES beyond our control, our production is partially dislocated. We are, however, making every effort to continue service and anticipate that our full capacity for regular lines will very shortly be available once more.

"The blast that blows the loudest
is soon overblown!"

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and ADAPTABILITY

The 'DREDNORT' Disconnecting Box with detachable glands has been in constant service for nearly 20 years, full patent rights being granted in 1922.

It is the pioneer of all disconnecting boxes with detachable glands.

These glands are supplied Straight, Right angle, Left angle, Dipping or to take two cables, also blanking off pieces when it is not required to connect up all the cables immediately. This adaptability will be appreciated by discriminating engineers.

The
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Notable Features ● DREDNORT boxes can be of the selective type if preferred ● Can be filled with compound before despatch ● Can be fitted with Coslok Patent links or with H.R.C. fuses, with or without porcelain carriers ● Can be fitted with sockets for ammeter plugs, or tong test ammeter can be used ● Fitted with clip type labels ● Can be supplied for 2-core to 6-core cables ● Are tested at 5,000 volts before despatch ● All current carrying parts are made in copper.

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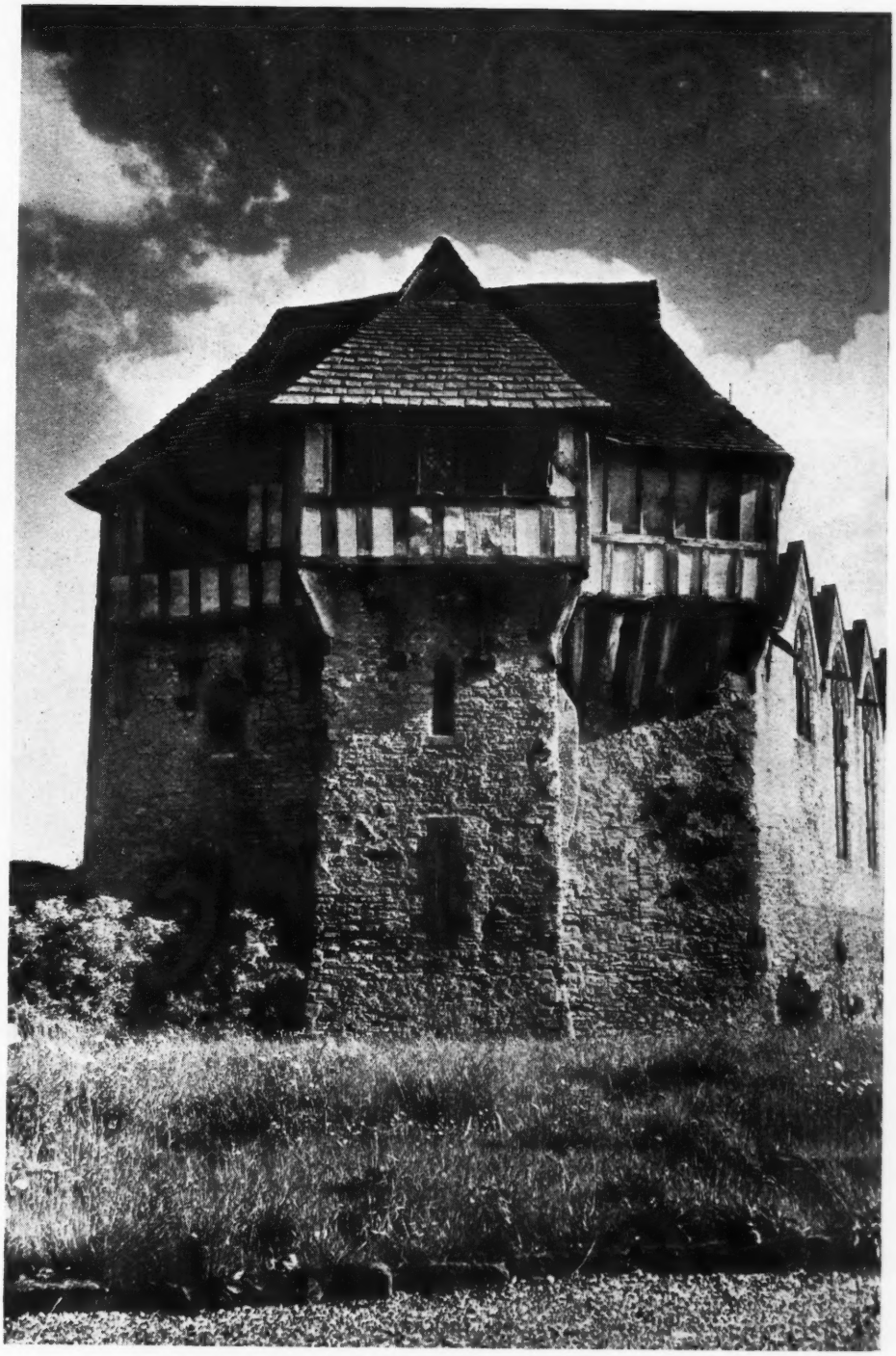
"An Englishman's Home—"

The 13th Century was a stormy period in English history, King John's conflict with the barons, culminating in Magna Charta; the opposition of Simon de Montfort and his party of nobles towards Henry III; the expeditions of Edward I against Wales and Scotland; these are but a few of the high lights in a very troubled period.

In those days, many an Englishman's home was also his fortress, and the architecture of the times bears witness to the fact. Stokesay Castle in Shropshire, illustrated here, dates from the 13th Century, and is believed to be the finest example of a fortified manor house in the country.



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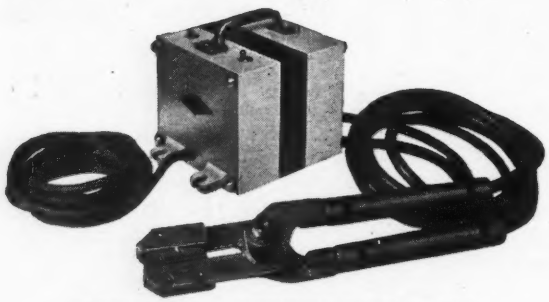
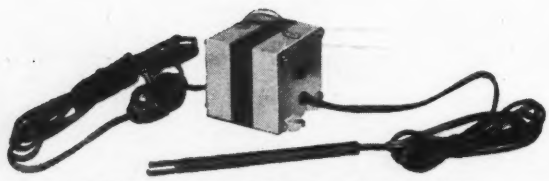


MODEL No. 3 MEDIUM DUTY UNIT



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- **These tools have now been adopted by important Manufacturers where rapid production is essential and many intricate soldering problems have been solved by the Stanelco Electrode method.**
- This new method can also be used for the application of heating required in certain processes other than soldering.
- These tools are operated on very low voltages with complete safety to the operator.
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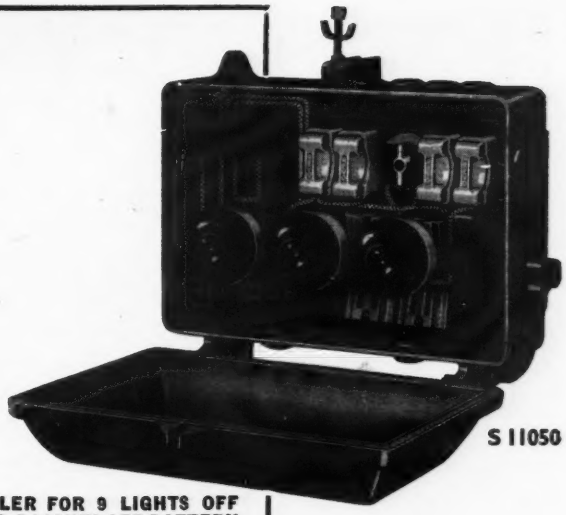
INEXPENSIVE AIR-RAID SHELTER LIGHTING EQUIPMENT



S 11050

S 11232

CONTROLLER FOR 9 LIGHTS OFF MAINS OR 5 LIGHTS OFF BATTERY

Conforming to Specification BS/ARP 6

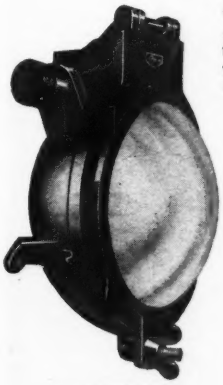
S11050. Designed for general Air-raid Shelter Lighting control. Galvanised case houses transformer with low voltage output to feed 9 points of 10 watts each at 12 volts. Changeover switch provides either 2 circuits of 5 or 4 points mains fed, or 5 points battery fed. Four 15 amp. S.P. Fuses, and three 5 amp. switches for main and sub-circuit control.

CONTROLLER FOR 2 OR 4 LIGHTS AND HANDLAMP OFF MAINS OR BATTERY

Conforming to Specification BS/ARP 26

S11232. Designed for small Shelters with 2 or 4 lights. Galvanised case houses D.P. Mains Switch and transformer with low voltage output of 12 volts. Changeover mains-to-battery switch incorporated. Two 5 amp. S.P. switches and fuses control 2 or 4 lights and handlamp from mains or battery.

C 11074



C 11038 NP

C. 11038 NP

Cast iron Bulkhead fitting. Hinged door. Available with glands for cable or tapped for conduit. B.C. Lampholder included.

C. 11074

Well-glass fitting with cast iron dome secured to 2-way ¾" conduit through-way box. B.C. Lampholder included. Glands for cable can be supplied.

C. 11042 NP

Well-glass fitting comprising heavy duty glass fixed to 5" white enamelled or Imit. Walnut Block. B.C. Lampholder included.

These fittings are for use with 12 volt, 10 watt Bus Type Lamps, and are made to give quick and easy access to lampholders.

Write for prices and full particulars.

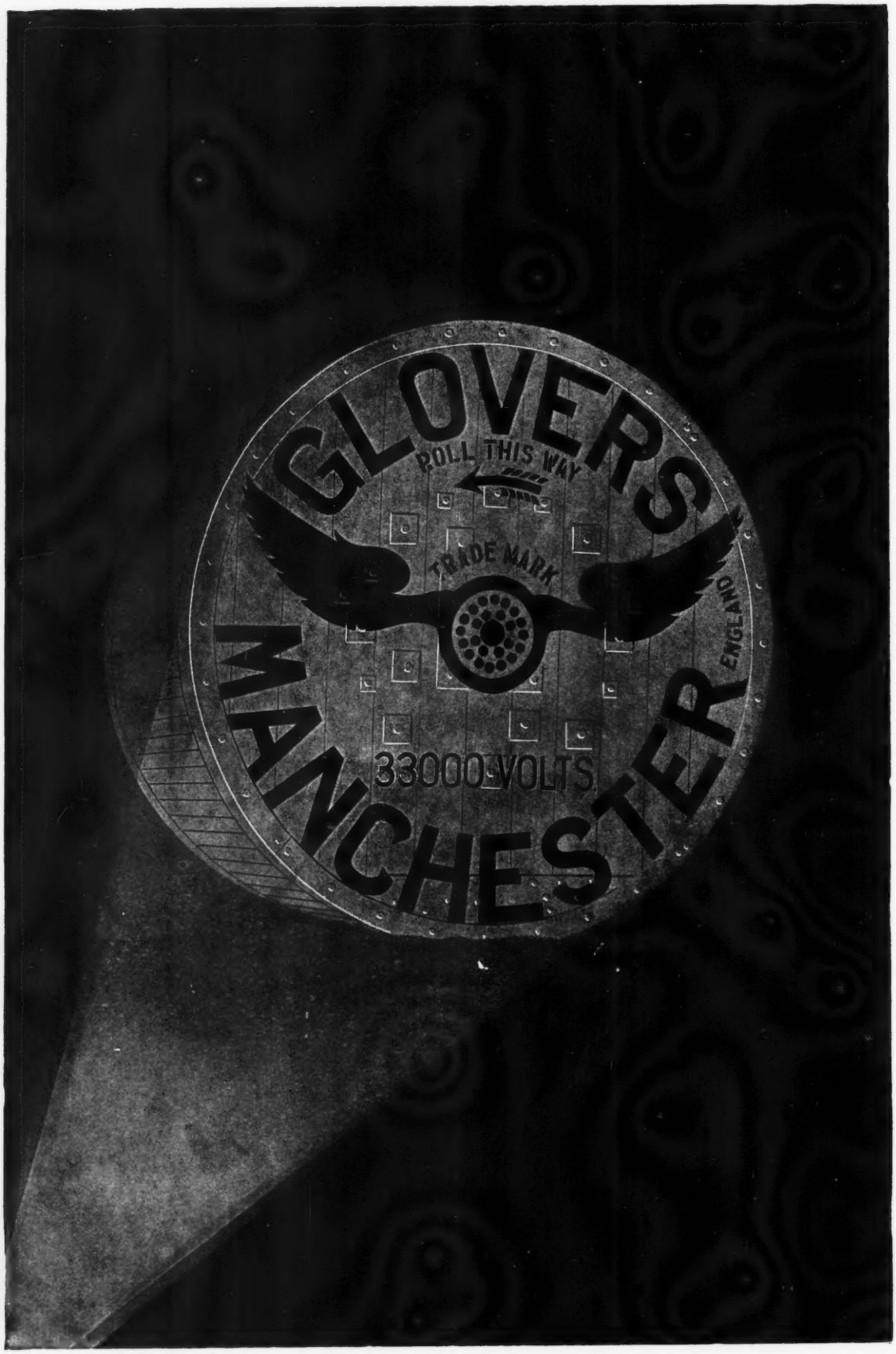
Revo

A.R.P. LIGHTING EQUIPMENT

C 11042 NP

CONFORMING TO SPECIFICATIONS BS/ARP 6 and BS/ARP 26

REVO ELECTRIC CO. LTD. TIPTON, STAFFS.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ROLL THIS WAY
TRADE MARK
MANCHESTER
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HIGGS MOTORS
GOVERNING DIRECTOR WALTER F. HIGGS, M.I.E.E. LTD.
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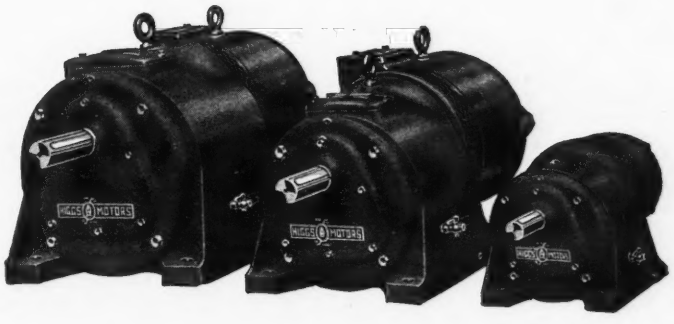

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For low speed requirements, HIGGS GEAR UNITS cover a range from 1/8 H.P. to 15·0 H.P. with output shaft speeds down to 9 R.P.M. Designed to withstand arduous, full load conditions, the complete unit is manufactured in our own Works at Witton.

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The Dependable

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BRUSH modern transformers are designed and built to ensure absolute dependability.

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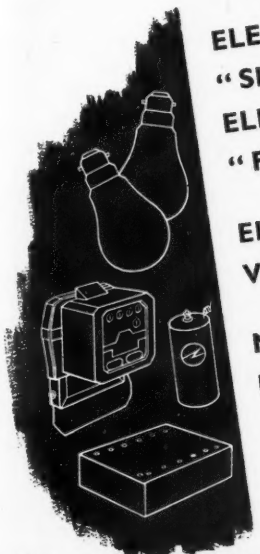
LOUGHBOROUGH, ENGLAND

SIEMENS

BRITISH MADE

A NAME FAMOUS IN THE ELECTRICAL WORLD FOR THE EXCELLENCE AND DEPENDABILITY OF IT'S PRODUCTS



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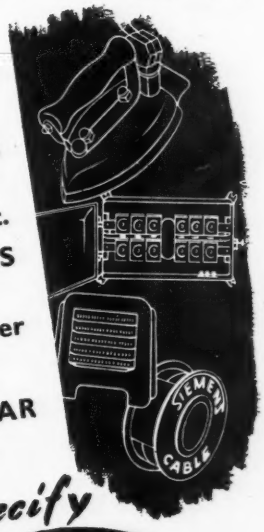

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Wind from the right quarter . . .

With a favourable wind the clipper races across the ocean, her tall, tapering masts and gleaming spread of snowy canvas providing a picture of loveliness and grace . . .

Industry also demands a satisfactory source of air supply, and instinctively turns to the manufacturers of Fans who have the necessary experience and knowledge which ensure the quality and efficiency of their products.

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and RELIABILITY
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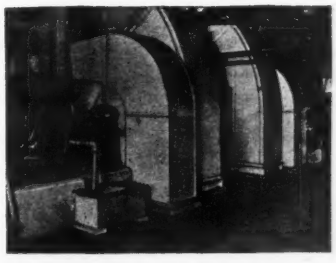

The illustration shows "Sirocco" Mechanical Draft Equipment installed in a large Power Station

DAVIDSON & CO. LTD., Sirocco Engineering Works, Belfast

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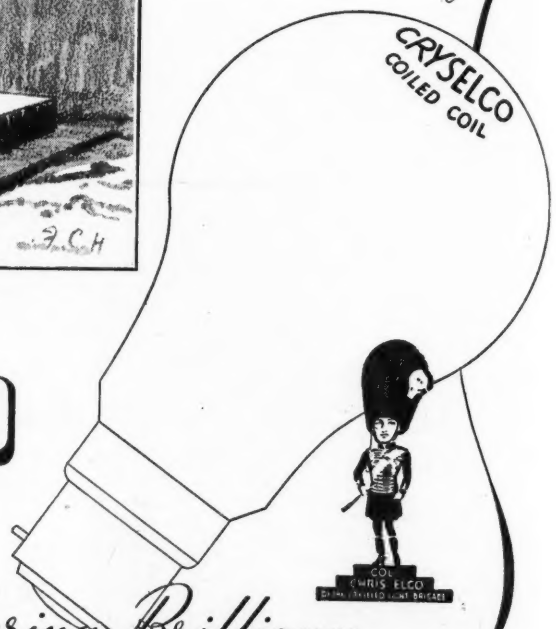
Light
ON THE PAST

BURNS STATUE
by F. W. Pomeroy, R.A.

Unveiled by Lord Rosebery at Paisley, 1897, to commemorate the centenary of the poet's death. The statue is in bronze and is a graceful and virile composition.



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Lamps of Enduring Brilliance

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Full production maintained with M·E·M *LOW VOLTAGE LOCALISED LIGHTING . . . . .*

Wartime blackout conditions in factories mean greater dependence on light. Speed and quality of production require that there should be plenty of light just where it is wanted, and economy and blacking-out require that it should be nowhere else.

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'MEMLITE' (REGD.) *Adjustable Lamp Fittings and* 'MEMLO' (REGD.) *Low Voltage Transformer Units*

'Memlite' Adjustable Lamp Fittings are made in Light and Heavy Industrial Patterns, 2 arm type. A 3 arm type is also available in the Heavy Industrial Pattern. Three different bases are available: for 'Memlo' or conduit attachment, and for portable use.

'Memlo' is made in three standard ratings :—

List No. 425 LV	- - -	400/440 volts down to 12 and 25 volts
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Each with output of 50 watts at either voltage.

Write for Folder 252 which gives full particulars.

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Specialists in Switch, Fuse and Motor Control Gear. *Manufacturers of High Efficiency Electric Fires.*

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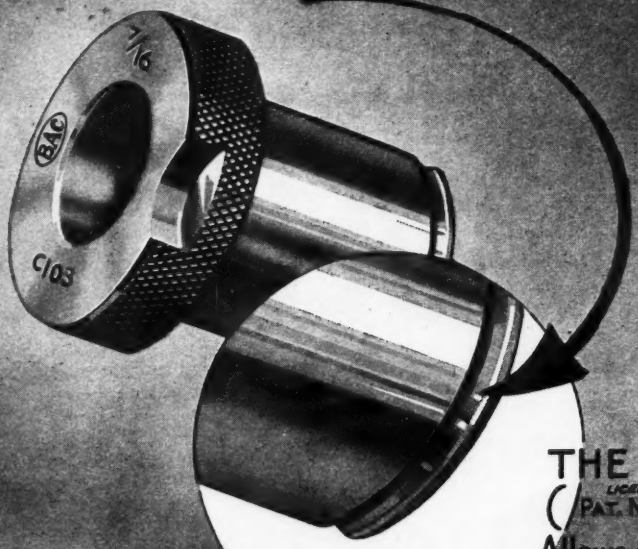

THE PILOT
(LICENCED UNDER PAT. NO. 515714)
Allows the use of close tolerances without risk of jamming and ensures quick & easy entry into the liner

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DRILL BUSHES

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'PILOT' ON THE RENEWABLE
TYPES

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Portable Calibration Set for trip coil settings

This specially designed, portable, calibration equipment will be of interest to switchgear makers and users alike. It permits an easy and accurate check on trip coil settings, and is therefore of distinct service to maintenance engineers as well as to the test room of switchgear makers. May we send you full details ?

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The mark that means that "little more" in quality

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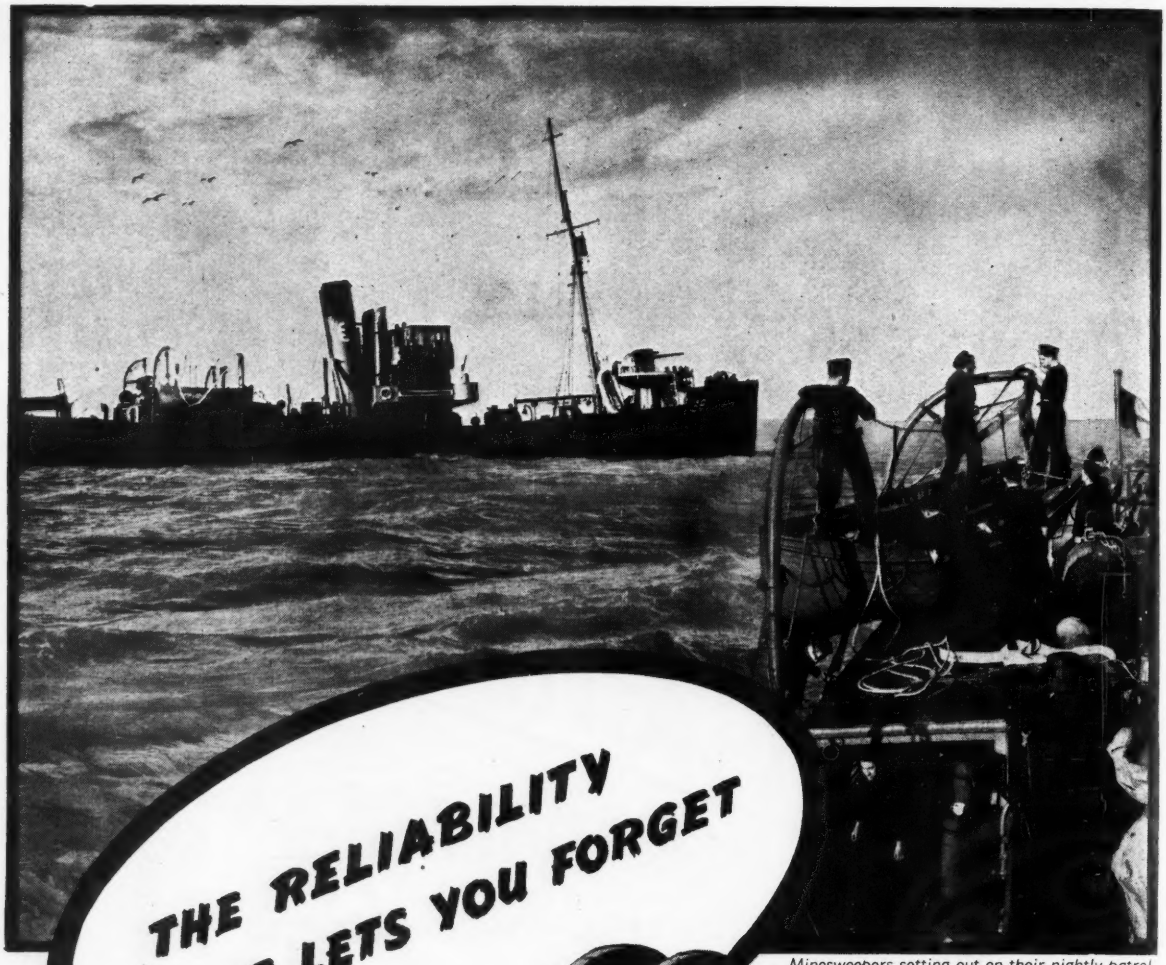

Minesweepers setting out on their nightly patrol.

THE RELIABILITY THAT LETS YOU FORGET

QUALITY OF CROMPTON CABLE ASSURED BY MODERN METHODS

Crompton Cable is made in one of the most modern cable factories in the world. Test, research and production are co-ordinated in a way that keeps a constant check on quality and makes it almost impossible for a flaw to escape. The minimum standards adopted are those of the relevant British Standard Specifications and of the Cable Makers' Association. Crompton Cable is available in all types of power cable up to 22,000 volts and also in V.I.R. cable.

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Cables are like that. Out of sight they are usually out of mind. Such is the reliability of the best British cable that it never occurs to anyone to question it. Crompton Parkinson are proud to have been able to contribute a great deal to this result.

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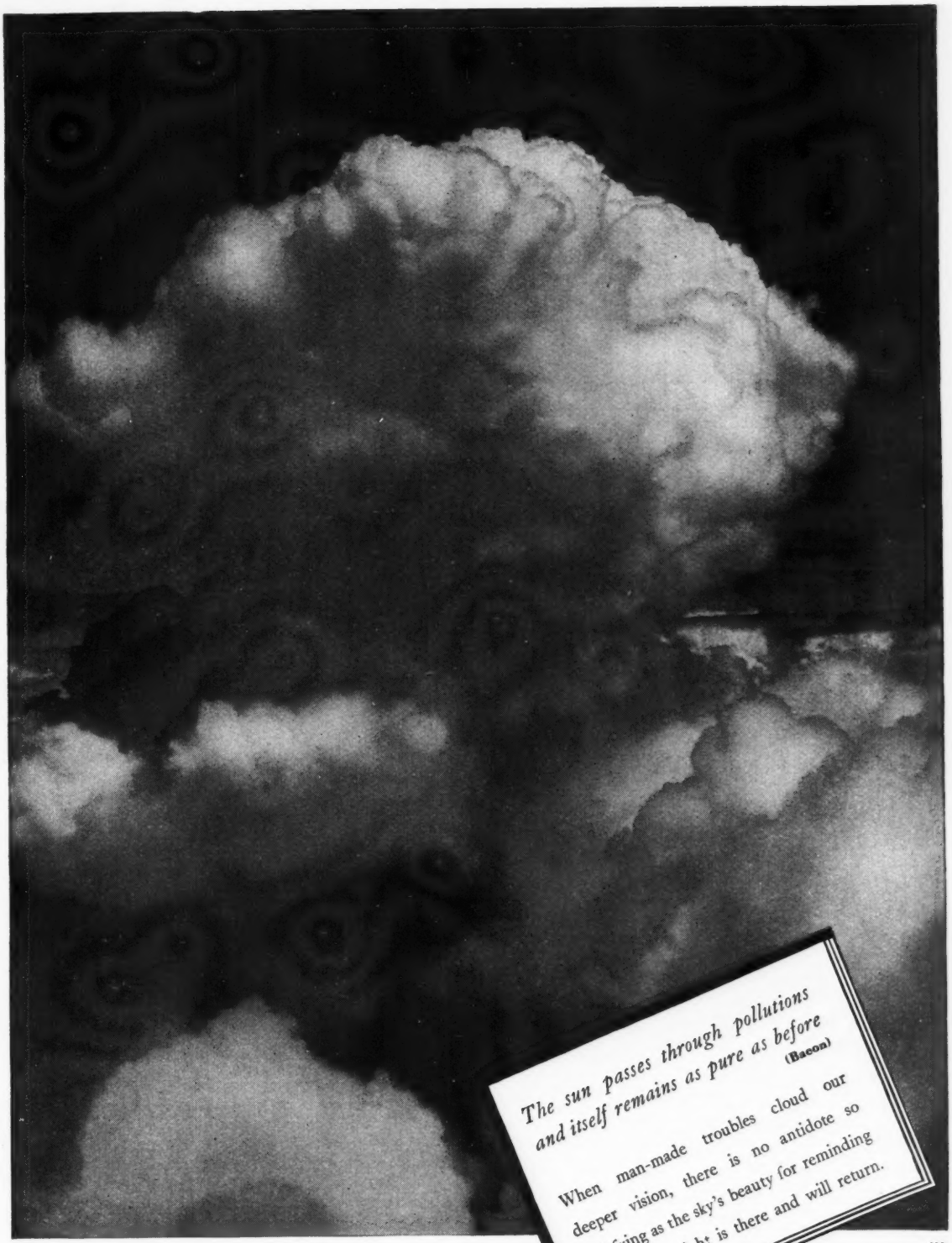
Crompark, Estrand, London

ASSOCIATED COMPANIES · THE BRITISH ELECTRIC TRANSFORMER CO. LTD · DERBY CABLES LTD · ATLAS SPRINKLER CO. LTD

Manufacturers of all types of electric motors · generators · switchgear transformers · electric traction equipment · instruments · paper and rubber insulated cables · ceiling fans · Crompton and Kye Lamps · lighting units · fire-fighting equipment

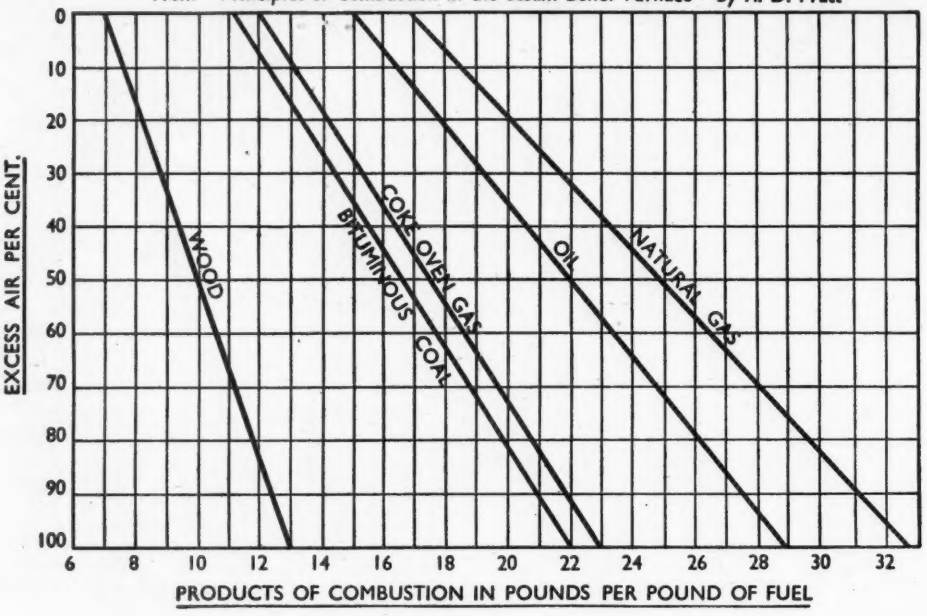

The sun passes through pollutions
and itself remains as pure as before
(Bacon)
When man-made troubles cloud our deeper vision, there is no antidote so satisfying as the sky's beauty for reminding us that the light is there and will return.
413

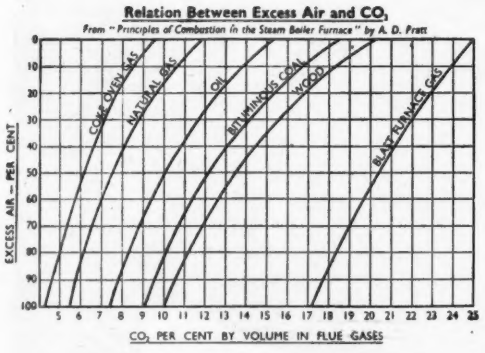
GEORGE ELLISON LIMITED · BIRMINGHAM 22 · ENGLAND

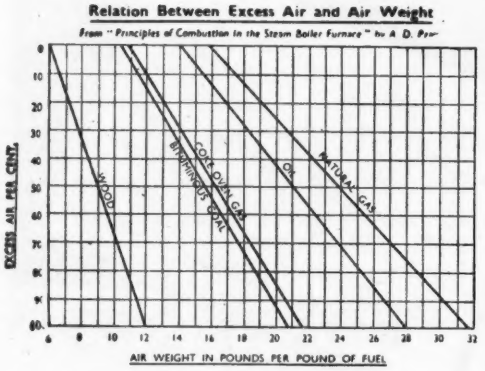
What does CO_2 mean?

Relation Between Excess Air and Products of Combustion

From "Principles of Combustion in the Steam Boiler Furnace" by A. D. Pratt




Relation Between Excess Air and CO_2
From "Principles of Combustion in the Steam Boiler Furnace" by A. D. Pratt
EXCESS AIR — PER CENT
COKE OVEN GAS
NATURAL GAS
OIL
BITUMINOUS COAL
WOOD
BLAST FURNACE GAS
CO_2 PER CENT BY VOLUME IN FLUE GASES


Relation Between Excess Air and Air Weight
From "Principles of Combustion in the Steam Boiler Furnace" by A. D. Pratt
EXCESS AIR PER CENT.
WOOD
BITUMINOUS COAL
COKE OVEN GAS
OIL
NATURAL GAS
AIR WEIGHT IN POUNDS PER POUND OF FUEL

FROM the above chart it will be seen that when burning 1 lb. of coal, an increase from 20% to 100% excess air means that the weight of the products of combustion is increased by approximately 8½ lb.

Our previous advertisement showed that this increase in excess air involved an increase in the weight of air for combustion by the same amount. Thus the forced draught and the induced draught fans together must handle approximately 17 lb. more air and products of combustion than that necessary for efficient combustion.

In the case of a boiler for 175,000 lb. of steam per hour, with 20% excess air the fan motors would be rated at 196 h.p., which would be increased at 100% excess air to 875 h.p. thus involving an increase in electrical input to the motor terminals of 570 KW. Assuming 20 hours per day and 300 days per year, at ½d. per KWH this unnecessary expenditure in fan power amounts to £7,130 per annum, which in itself is more than sufficient to pay for a Bailey furnace. This sum capitalised at 4% interest for 20 years amounts to over £212,000. Bailey furnace construction permits operation with minimum excess air over a very wide range of load, so that the saving in fan power debit alone gives a very handsome return on capital invested.

Criticism might be made that the limits are too wide in the foregoing example, but even if operation is assumed with 60% excess air, then the unnecessary fan power expenditure is £2,840 per annum, which when capitalised amounts to £84,570. However, when it is realised that this fan power debit is one of the smallest items entering into the balance sheet, it will be obvious that Bailey furnace construction is in the last analysis the cheapest construction which can be installed.

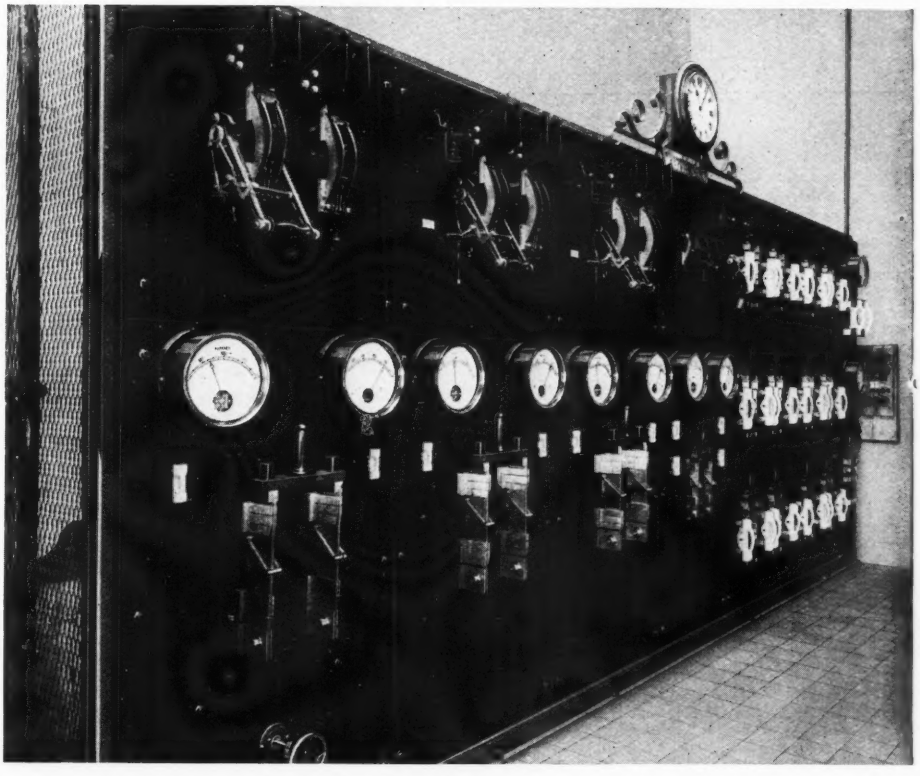
(For convenience we reproduce the charts from our Nos. 1 and 2 advertisements in this series, showing the relationship between excess air and CO_2 and weight of air for combustion.)

This is the third of a series of three advertisements

BABCOCK & WILCOX LTD. BABCOCK HOUSE, FARRINGDON ST. LONDON, E.C.4.

THE VERITY RANGE

SWITCHGEAR



Veritys manufactures include :—

Switches : ranging from 15 to 1,000 amps. Home Office type, hinge not carrying current. Export type, hinge carrying current.

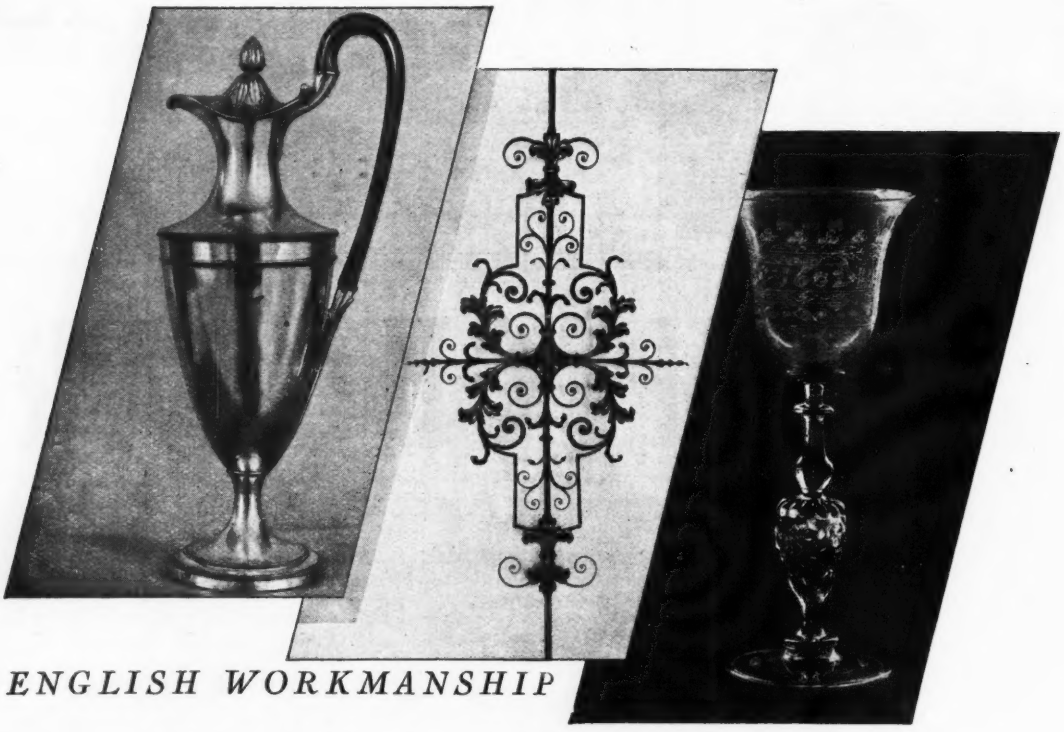
Fuses : Home Office type 15 to 1,000 amps.

Switchboards, as illustrated, which shews a recent installation, embodying 1,000 amp. main and 600/350 amp. feeder panels.

VERITYS LIMITED

• ASTON, BIRMINGHAM 6

Sales Headquarters :
BRETTENHAM HOUSE, LANCASTER PLACE, W.C.2



ENGLISH WORKMANSHIP

Whatever the material may be, it has its own character. It may be strong or weak, tough or brittle—any one of a hundred things—but whatever it may be, that character will in general control the method of working it and the limits of the things into which it can be made.

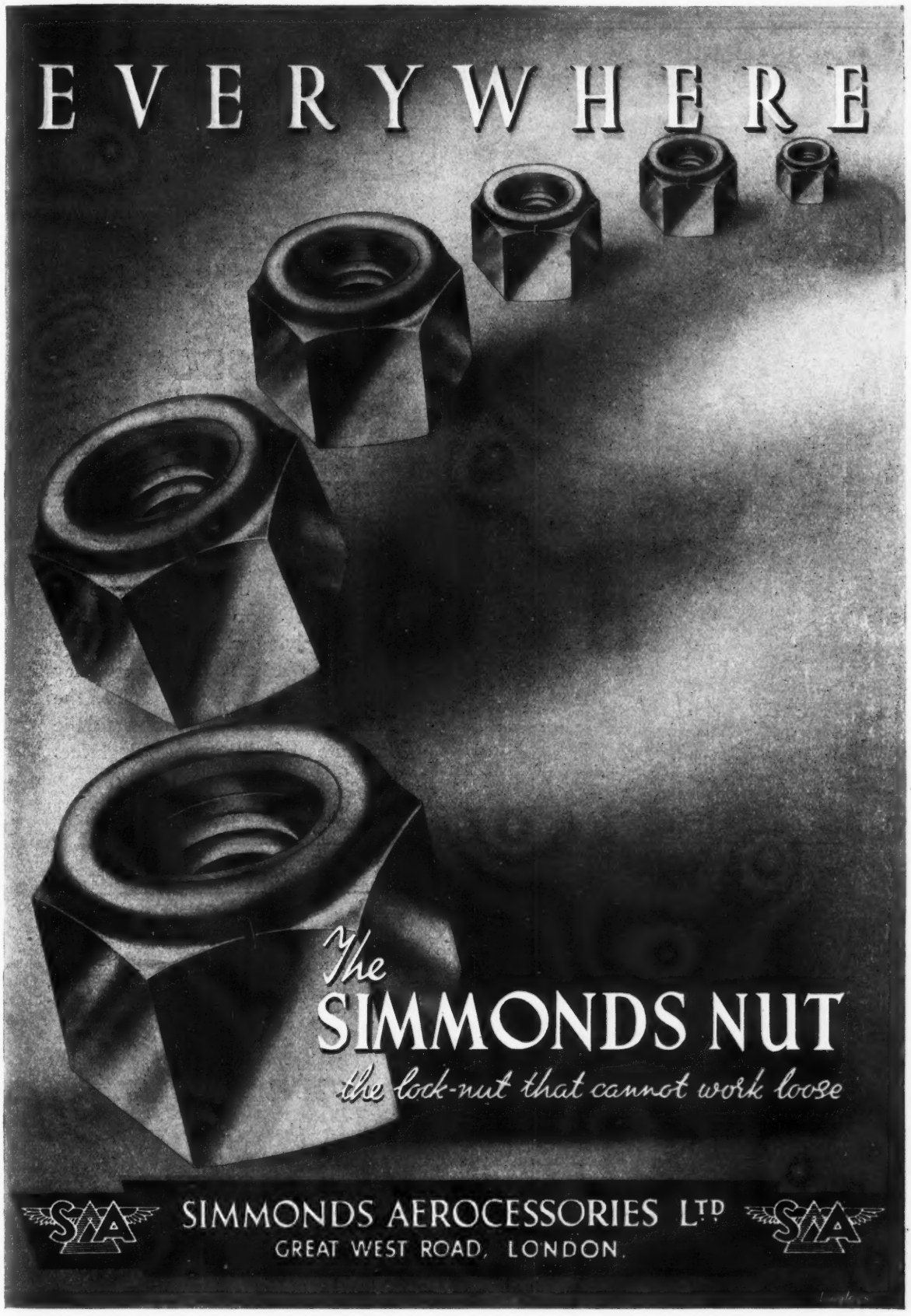
And within those limitations constant practice will develop a facility of execution, an ability to carry to a fine conclusion that which we set out to make.

English workmanship is famous because, although the dictionary does not say so, our skill is generally coupled from the very start to a higher ideal in purpose and design.

Fischer

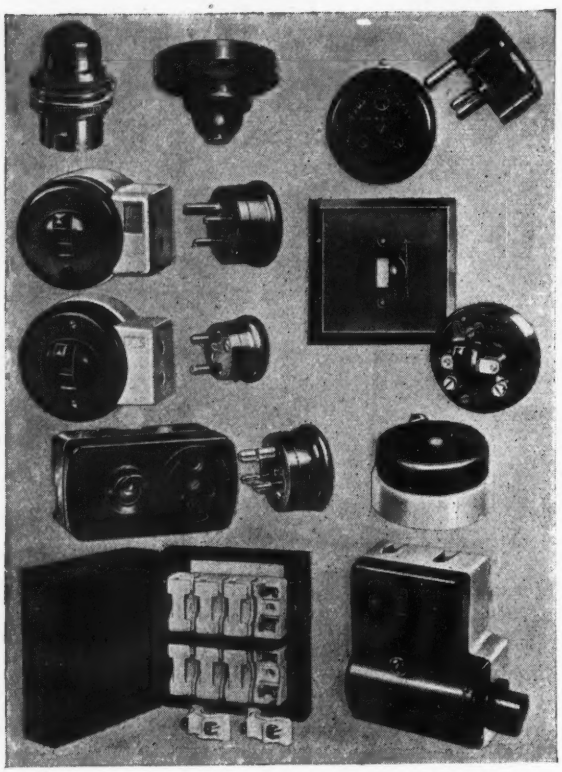
ALL-BRITISH ball and roller bearings and transmission equipment

Fischer Bearings Co. Ltd., Upper Villiers St., Wolverhampton. Associated with British Timken Ltd.


EVERYWHERE
The
SIMMONDS NUT
the lock-nut that cannot work loose
SIMMONDS AEROCESSORIES LTD
GREAT WEST ROAD, LONDON.

G.E.C.

Electric Lighting Accessories



EVERYTHING FROM

MAIN SWITCH TO LAMPHOLDER

The largest variety of British-made Accessories

Manufactured by the pioneers of Bakelite accessories in Great Britain and complying with regulations and recommendations (wherever they apply) of the Home Office, the British Standards Institution and the Institute of Electrical Engineers

Over 30 G.E.C. branches are ready to serve—with stocks of all standard lines

ABERDEEN
BELFAST
BIRMINGHAM
BLACKBURN
BLACKPOOL
*BOURNEMOUTH
*BRADFORD
BRIGHTON
BRISTOL
CANTERBURY
CARDIFF
CORK (EIRE)
CROYDON
DUBLIN
DUNDEE
EDINBURGH
GLASGOW
GLOUCESTER
HULL
INVERNESS
IPSWICH
LEEDS
LEICESTER
LIVERPOOL
LONDONDERRY
LUTON
MANCHESTER
MIDDLESBROUGH
NEWCASTLE-ON-TYNE
*NORTHAMPTON
NOTTINGHAM
PLYMOUTH
READING
SHEFFIELD
SOUTHAMPTON
STOKE-ON-TRENT
SWANSEA

* *Osram Lamp Sales Depots only*

Get into touch with your nearest G.E.C. branch NOW

Head Office at which large stocks are also held

THE GENERAL ELECTRIC CO., LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2

NATIONAL EMERGENCY. *Please assist by saving all packing material for collection when our van calls*

ELECTRICAL REVIEW

Classified Advertisements

ADVERTISEMENTS for insertion in the following **Friday's** issue are accepted up to **First post on Monday**, at Dorset House, Stamford Street, London, S.E.1.
THE CHARGE for advertisements in this section is 1/2 per line per insertion, or for display advertisements 14/- per inch, with a minimum of one inch.
FOR SITUATIONS VACANT AND WANTED there is a special reduced rate of 1d. per word if prepaid, minimum 1/-. A Box Number, when required, is charged as six words, and there is also in this case an additional charge of 6d. for postage of replies. Three insertions under these headings can be obtained for the price of two if ordered and prepaid with the first insertion. If placed to account the charge for each insertion is 2/6 for three lines and 9d. for each additional line.

REPLIES TO advertisements published under a Box Number if not to be delivered to any particular firm or individual should be accompanied by instructions to this effect, addressed to the Manager of the ELECTRICAL REVIEW. Letters of applicants in such cases cannot be returned to them. The name of an advertiser using a Box Number will not be disclosed. All replies to Box Numbers should be addressed to the Box Number in the advertisement, c/o ELECTRICAL REVIEW, Dorset House, Stamford Street. London, S.E.1. Cheques and Postal Orders should be made payable to ELECTRICAL REVIEW LTD. and crossed. Notes cannot be traced if lost in transit. They must therefore be regarded as being despatched at sender's risk. Alternatively they may be sent per registered post.

Original testimonials should not be sent with applications for employment.

OFFICIAL NOTICES, TENDERS, ETC.

COUNTY BOROUGH OF BURY

Electricity Department

THE Electricity Committee of the above Corporation invite Tenders for the supply and delivery of :—

5 625 kVA, 3-phase, 6,500/400/230 volts, 50 cycle transformers in tubular tanks.

Copies of Specification and Form of Tender may be obtained upon application to Mr. J. G. Potts, A.M.I.E.E., A.M.I.Mech.E., Engineer and Manager, Electricity Department, Market Street, Bury, on payment of a deposit of £1 1s., which deposit will be returned on the submission of a bona-fide Tender.

Cheques are to be made payable to the Borough Treasurer and forwarded to the Engineer and Manager, together with the application for the Specification.

The Committee will not consider any Tender except on the authorised form, which must be delivered to the undersigned not later than Monday, 17th March, 1941.

The Committee does not bind itself to accept the lowest or any tender.

RICHARD MOORE,
Town Clerk.

Municipal Offices,
Bank Street,
Bury.
21st February, 1941. 4852

KEIGHLEY CORPORATION

Electricity Department

THE Electricity Committee invite TENDERS from British Manufacturers (who can guarantee that all the materials used have been made in Great Britain) for ONE YEAR'S SUPPLY, as from 1st April, 1941, of the items Nos. 1 and 2 below :—

1. MOTORS.
2. STARTERS.

The Committee also invite Tenders for HIGH-TENSION OVERHEAD LINE WORK in connection with two short Overhead Lines having route lengths of 170 yards and 230 yards respectively.

Specifications and other particulars may be obtained from the undersigned on written application, but, in the case of the overhead lines, tenderers will be expected to survey the route and to plot their own pole positions.

Sealed Tenders, in plain envelopes, giving no indication either on seals or in any other way of the name of the tenderer, endorsed either "Tender for MOTORS, STARTERS, or Overhead Lines" respectively, to be sent to the Town Clerk, Town Hall, Keighley, by registered post not later than Thursday, the 13th March, 1941.

The Electricity Committee do not bind themselves to accept the lowest or any tender.

HARRY WEBBER, M.I.E.E., M.I.Mech.E., M.I.T.,
Borough Electrical Engineer & General Manager.

Electricity Offices,
Coney Lane, Keighley.
21st February, 1941. 4857

"CLASSIFIED" ADVERTISEMENTS
must reach us by
FIRST POST on MONDAY
for inclusion in the same week's issue
E.R.6

OFFICIAL NOTICES, TENDERS, Etc.—*Continued*

CITY AND ROYAL BURGH OF EDINBURGH

Electricity Supply

TENDERS are invited for the supply of 36 4-way Link Disconnecting Boxes suitable for use with .3 sq. in. 4-core paper-insulated, lead-sheathed, double steel tape armoured cable, 1,000 volts, to table 4 B.S. Specification 480, 1933.

Copies of the Specification and Form of Tender may be obtained from the undersigned. Sealed tenders, endorsed "Tenders for Link Disconnecting Boxes," must reach this office not later than 10 a.m. on Tuesday, 11th March, 1941.

The Corporation do not bind themselves to accept the lowest or any tender.

J. ECCLES,
Engineer and Manager.

Electricity Dept.,
Dewar Place,
Edinburgh, 3. 4853

SITUATIONS VACANT

BOROUGH OF LUTON

Substation Attendant

APPLICATIONS are invited for the position of Substation Attendant at the Corporation Electricity Works. Applicants must have had experience with the operation of a D.C. 3-wire system of supply, and the running and maintenance of Rotary Convertors. Preference will be given to those also having had experience with A.C. 3-phase supply.

Salary in accordance with the Joint Industrial Council (No. 9 Area) Schedule, at present £4 18s. per week of 48 hours. The successful candidate will be required to pass a medical examination, as the appointment is subject to the provisions of the Local Government Supperannuation Act, 1937. Applications, endorsed "Substation Attendant," stating age, qualifications and experience, should be addressed to me, and must be received not later than Monday, March 10th, 1941.

RENNIE DEAN, M.I.E.E., M.I.Mech.E.,
General Manager and Chief Engineer.

Electricity Offices,
St. Mary's Road,
Luton, Beds. 4819

METROPOLITAN BOROUGH OF FULHAM

Electricity Department

APPLICATIONS are invited for the position of Temporary Female Showroom Assistant and Demonstrator from persons holding the E.A.W. diploma or equivalent. Salary according to experience and ability, minimum £125, maximum £250 per annum, plus war bonus, at present 6%. Applications will only be considered from candidates who have had a thorough training in the principles of salesmanship, who have had at least 3 years' experience in a sales position and who can give proved results of their sales ability.

Form of application may be obtained on sending a stamped addressed foolscap envelope to the undersigned, to whom completed applications (endorsed "Showroom Assistant") must be delivered by 12 noon on 10th March, 1941.

WILFRED TOWNEND,
Town Clerk.

Town Hall,
Fulham, S.W.6. 4836

SITUATIONS VACANT—*Continued*

CORPORATION OF PAISLEY

Electricity Department

Meter Mechanic

APPLICATIONS are invited for the above position from persons having sound experience in the overhaul and repair of multi-coin prepayment meter attachments, and must be ineligible or not have registered for military service.

Wages in accordance with the N.J.I.C. No. 13 Area.

The appointment will be subject to the provisions of the Local Government Superannuation Act, 1922, and the successful candidate must pass a medical examination.

Applications, stating age and full particulars of training and practical experience, with copies of recent testimonials, to reach the undersigned not later than 8th March, 1941, endorsed "Meter Mechanic."

JOHN P. MORRISON,
Town Clerk.

Municipal Buildings,
Paisley. 4801

CITY OF LEICESTER EDUCATION COMMITTEE

College of Technology and Commerce

Principal: L. W. Kershaw, B.Sc., A.M.Inst.C.E., F.G.S.

REQUIRED immediately, a Full-Time Lecturer in Mechanical Engineering with some knowledge of Electrical or Automobile Engineering. Applicants should have had good works experience and should possess a Degree in Engineering or an equivalent qualification.

Salary in accordance with the Burnham Scale with additional increments for industrial experience and special qualifications.

Applications, stating age, places of education, training qualifications, teaching and industrial experience, accompanied by three recent testimonials and the names of three referees, should be submitted to the Principal not later than March 8th, 1941.

H. S. MAGNAY,
Director of Education.
4830

CROWN AGENTS FOR THE COLONIES

Colonial Government Appointments

APPLICATIONS from qualified candidates are invited for the following post :—

ELECTRICAL MECHANIC required by the Government of Nigeria for the Public Works Department for two tours of 12-24 months each with prospects of permanency. Salary £400-£12-£560 per annum. Outfit allowance £25. Free passages and quarters and liberal leave on full salary. Candidates, age 25-35, must previously have been employed in electrical workshops and have had not less than 5 years' general experience in armature rewinding, general testing and overhaul of all types of A.C. and D.C. motors and control gear and repairs to all classes of electrical appliances.

Apply at once by letter, stating age, whether married or single and full particulars of qualifications and experience, and mentioning this paper, to the Crown Agents for the Colonies, 4, Millbank, London, S.W.1, quoting M/9538. 4838

SITUATIONS VACANT—*Continued*

CITY AND COUNTY OF THE CITY OF CHESTER

Electricity Department

Chief Clerk and Cost Accountant (Permanent)

APPLICATIONS are invited for the position of Clerk Clerk and Cost Accountant in the Electricity Department of the Corporation. Candidates must have had extensive experience in municipal electricity costing, and the keeping of stocks and stores records with particular reference to mechanical methods. They must be capable of taking charge of this section of the office under the direction of the engineer and manager. The holding of the final certificate of the Institute of Cost and Works Accountants will be deemed an advantage. The salary payable is in accordance with Grade C of the Corporation's scale, commencing at £320 per annum and rising by annual increments of £15 to £350 per annum. The post is superannuable and may be terminated by one month's notice from either side; the person appointed will be required to pass a medical examination. Relationship to any member or official of the City Council must be disclosed and canvassing in any form will disqualify. Applications, endorsed "Chief Clerk and Cost Accountant," stating age and experience, and accompanied by copies of three recent testimonials, should be addressed to the Engineer and Manager, Electricity Department, Northgate Street, Chester, and must reach him on or before Friday, 14th March, 1941.

G. BURKINSHAW,
Town Clerk.
4843

CORPORATION OF PAISLEY

Electricity Department

Appointment of Deputy Electrical Engineer and Manager

APPLICATIONS are invited for the above appointment from experienced Engineers having a thorough practical and technical training in all Departments of an Electricity Supply Undertaking, together with a thorough knowledge of the commercial and administrative sides.

Extensive experience on large distribution Networks is essential, with a sound knowledge of change-over work.

Preference will be given to applicants under 40 years of age who are Chartered Electrical Engineers. The appointment will be subject to the provisions of the Local Government Superannuation Act, 1922, and the successful candidate must pass a medical examination.

The salary will be £590 rising to £620 per annum.

Applications, stating age and full experience of experience and appointments, together with copies of three recent testimonials, to reach the undersigned not later than 8th March, 1941, endorsed "Deputy Engineer and Manager."

JOHN P. MORRISON,
Town Clerk.

Municipal Buildings,
Paisley. 4802

BOROUGH OF ROYAL TUNBRIDGE WELLS

Electricity Department

SWITCHBOARD Attendant, salary in accordance with National Joint Board Schedule, Grade 9A, Class E, present salary £246 per annum.

Applications, stating age, qualifications, experience, when at liberty, and enclosing copies of recent testimonials, and endorsed "Switchboard Attendant," to be delivered to the Borough Electrical Engineer, "Mountfield," 33, Grove Hill Road, Tunbridge Wells, not later than first post Monday, 10th March, 1941.

R. N. TORPY, M.I.E.E.,
Borough Electrical Engineer.
24th February, 1941. 4858

WINDING SHOP MANAGER

THOROUGHLY experienced practical man to take charge of Winding Shop of 150 hands (mostly female). Must be right up to date on small armatures and A.C. and D.C. windings up to 5 H.P. used to control of labour, piece work systems, rates. Age preferably over 40. Work of National importance. Good salary. Superannuation. Permanent staff position for right man. Apply by letter.—M. W. Woods, Ltd., Propelair Works, Colchester. 4767

SITUATIONS VACANT—*Continued*

RATE FIXER WANTED

EXPERIENCED Rate Fixer with a thorough knowledge of Piece Work Times and Systems as applied to Electrical Windings. Preferably one experienced in timing sectionalised operations on small armatures and A.C. and D.C. windings.

Apply, stating age and experience, etc., to—M. W. Woods, Ltd., Propelair Works, Colchester. 4768

ARMATURE Winder Charge Hand, also Armature Winders, fully qualified, also Improvers required, used to A.C. and D.C. repairs. Top wages. Permanency for right men. Apply—Phillips & Sons Electrical, Ltd., 40, Waterford Road, Walham Green, S.W.6. 6478

ASSISTANT with some electrical knowledge required in our technical sales department dealing with important Government contracts. Permanent and progressive position. Give full particulars and state salary required to—The Cressall Manufacturing Co., Ltd., 31/32 Tower Street, Birmingham 19. 4827

CLERK wanted with knowledge of stock system for stores control. Previous experience in a similar capacity preferable. Apply—British Central Electrical Co., Ltd., 6-8, Rosebery Avenue, London, E.C.1. 4845

DRY Batteries. Large non-association works require experienced Assistant Electro-Chemist with research experience. Permanent position. Apply, stating fullest particulars, salary required, etc., to—Box 4851, c/o The Electrical Review.

ELECTRO or Physical Chemist with research experience, preferably with Ph.D. degree. Some acquaintance with technical problems relative to dry batteries is essential. Apply, stating full details and salary required, to—Box 4850, c/o The Electrical Review.

ENGINEER for extensive contract, overhead distribution lines and underground cables, etc. Full particulars of experience and salary required to—Box 4848, c/o The Electrical Review.

ESTIMATOR required accustomed to handling public tenders and correspondence for house service electricity meters. Some knowledge of commercial instruments preferable. Apply, stating age, experience and salary required, to—Commercial Manager, Crompton Parkinson, Ltd., Chelmsford, Essex. 4805

INDUSTRIAL Lighting Reflector Manufacturers require a trained engineer, age 30-40. Salary about £300 p.a. and allowances. Specialised lighting training will be given. Own car. Experience of speciality selling to factory executives and present residence in territory (South Staffs.) desirable. Details in own handwriting, with dates, of technical training and experience to—Box 6481, c/o The Electrical Review.

INSPECTOR required, male, for electric lamp factory, North London. Applicants should write stating experience, age and salary required. Apply—Box 4854, c/o The Electrical Review.

LIGHT Electrical Manufacturers in South London require men for maintenance and supervision of electrical testing gear, used for inspection. Some knowledge of mica frequency and telephone technology essential. Write, stating age, experience and salary required, to—Box 7141, A.K. Advg., 4, Talbot Mansions, Museum Street, W.C.1. 4828

LINESMEN required, safe area. Long job, good rates. Apply, with particulars experience, to —Box 4826, c/o The Electrical Review.

METER reader and fixer with knowledge of A.C. single-phase meter testing. £3 16s. per week of 48 hours with overtime at J.I.C. rates. Reply to undersigned, stating particulars of experience, age, if married or single, when free, and giving particulars of experience.—W. J. Smither, Borough Electrical Engineer, Trinity Street, Dorchester. 6522

ORDER Clerk and Correspondent required by Electrical Manufacturers in Manchester district. Good opportunity for person able to work on own initiative.—Box 4808, c/o The Electrical Review.

OVERHEAD Line Engineers, foreman and linesmen required by Pirelli-General Cable Works Ltd., Southampton. 4812

SMART Boys required as apprentices for electrical department. First-class opportunity for right boys. Apply—Phillips & Sons Electrical, Ltd., 40, Waterford Road, Walham Green, S.W.6. 6479

TRANSFORMER Winder and Transformer Assembler, experienced, required.—Brentford Transformers, Ltd., Brentford. 4804

TURBINE Driver required immediately, fully qualified, wages £4 1s. for six eight-hour shifts to commence. Superannuation scheme. Apply, with full particulars of experience, to—Box 4856, c/o The Electrical Review.

WIREMAN-Electrician, London, all-round experience, full rate.—Freeman, 253, Whitechapel Road, E.1. 4788

WIREMAN-Electrician wanted, age 30 or over, Southern Counties, safe area, rate 1s. 6½d. plus 11s. 8d. Must have first-class references. Liberal allowance for M/C or car.—Box 4855, c/o The Electrical Review.

WORKING Storekeeper required by firm of wholesale electrical engineers. Previous experience similar capacity essential. Apply—British Central Electrical Co., Ltd., 6-8, Rosebery Avenue, London, E.C.1. 4846

SITUATIONS VACANT—*Continued*

WORKS Manager (30-45) wanted now by manufacturers of well-known household electrical goods, to reorganise for aircraft electrical equipment, modern factory near London employing 250 mixed labour. Applicant must be trained engineer having sound experience of quantity production methods on light and medium work, thorough knowledge of factory organisation, good personality. Permanent post, good salary and prospects for right man capable of dealing with large-scale extension after the war. —Box 6521, c/o The Electrical Review.

APPOINTMENTS FILLED

Dissatisfaction having been so often expressed that unsuccessful applicants are left in ignorance of the fact that the position applied for has been filled, may we suggest that Advertisers notify us to that effect when they have arrived at a decision? We will then insert a notice free of charge under this heading.

BOX 4533—Assistant Engineer.

SITUATIONS WANTED

A fully-qualified Electrical Engineer, aged 35, seeks change. Extensive experience of installation and maintenance of large industrial generating and utilizing equipment. Specialist in industrial control devices as used on machine tools, paper-making plant, large arc and heat-treatment furnaces, printing machinery, etc. Minimum salary £350.—Box 6520, c/o The Electrical Review.

AN Executive Post. Extensive experience, buying, sales, secretarial, departmental management. Work of national importance preferred. Adaptable, energetic, trustworthy. Not liable military service. Moderate salary.—Box 6497, c/o The Electrical Review.

ARMATURE Winder, first-class London experience, desires responsible post. Traction work and safe area preferred. Extensive experience in repair work. Highest testimonials.—Box 6451, c/o The Electrical Review.

B.T.H. Student Apprentice, Grad. I.P.E., H. Nat. Cert. (Elec.), H. Nat. Dip. (Mech.), electrical construction, draughting, planning experience, desires post as assistant works engineer. Age 27. Minimum salary £400.—Box 6513, c/o The Electrical Review.

COMPETENT Electrical Engineer, age 40, desires responsible position. Extensive experience of installation and maintenance of power plant in large works and factories. Good organising ability. Minimum salary £450.—Box 6489, c/o The Electrical Review.

CONTRACT or Sales Engineer, with extensive experience in home and overseas markets, accustomed to negotiating and handling of contracts for generating plant, rotating machines, (A.C. and D.C.) Switchgear, Transformers, etc., desires position of trust and responsibility with firm of repute.—Box 6446, c/o The Electrical Review.

ELECTRIC Lamp Manufacturers.—Young man, 30, desires post in lamp factory as production manager, labour manager or similar position. Experienced in all branches of lamp making; holder of National Certificate in Electrical Engineering. Good record for labour control, quality of product and maximum output at minimum cost. London district preferred. Would not consider offer less than £7 per week salary to commence.—Box 6510, c/o The Electrical Review.

ELECTRICAL Engineer, aged 36, with 16 years' wide experience in generation and distribution of electricity, including five years as deputy manager in control of administrative, engineering and operative staff of large London undertaking, seeks permanent administrative position in electricity supply industry.—Box 6475, c/o The Electrical Review.

ELECTRICAL Engineer, age 38, all branches domestic apparatus, water heating, D.C. and A.C. power installations, 20 years supply undertaking, town and rural, L.T. and H.T. operation work, estimating, contracting, consumers' enquiries, office and showroom routine and administration, first-class references, requires situation with scope for knowledge and experience as consumers' engineer or charge service engineer.—Box 6473, c/o The Electrical Review.

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COMPANY MEETING

ENGLISH ELECTRIC COMPANY

Dividend Maintained

MR. G. H. Nelson, M.I.E.E., presiding at the 22nd Annual General Meeting of The English Electric Co., Ltd., held on the 20th February, in London, said that although the Accounts again showed a substantial Bank Overdraft, it would not be overlooked that, as compared with a year ago, the liquid assets were increased by £112,265 to £2,918,983. The amount set aside for depreciation had been increased to £100,000, which was in excess of the additions to fixed assets during the year. Despite the level of taxation the Company had earned 15% on its Ordinary Capital.

Something might be said at any time against a policy of distributing in dividends two-thirds of the amount earned for Ordinary Shareholders by an industrial company engaged in world trade in a highly competitive industry, but the Board were satisfied, knowing the strength of the Accounts, that, in times like the present, there was more to be said on the other side, that is for maintaining the dividend. To many of the Shareholders the dividend on their shares was an important or even the principal part of their income.

EXCESS PROFITS TAX.

He pointed out the vulnerability of the Company to Excess Profits Tax, and stated he would be failing in his duty if he did not draw the special attention of the Government to the fact that the Tax, in its present form, was no less likely to jeopardise the stability of employment of workpeople than to diminish the income of shareholders. The Board's policy had always been governed by a desire to do everything in its power to give stability of employment to its employees, and they would continue to work for the removal of anomalies that caused the tax to be neither fair nor wise. Referring to the Company's activities, he stated that, although at the moment little could be done about the future after the war, there seemed every reason to believe, in spite of all that was uncertain or obscure, that the Company, with its long tradition of technical knowledge and skilled craftsmanship, with active commercial relations in every corner of the world, and fortified by the protective armour of a sound Balance Sheet and strong finances, could not fail to find a wide field of fruitful activity in both the Home and Export markets.

The Chairman paid a tribute to the loyalty and endurance of the staff and workpeople who had worked for long hours and often in trying conditions. In conclusion, he stressed the important part played by the Company and its employees in connection with the National Savings movement.

The Report and Accounts were adopted, and in addition to the 6½% Preference Dividend a Dividend of 10% was declared on the Ordinary Stock.

4831

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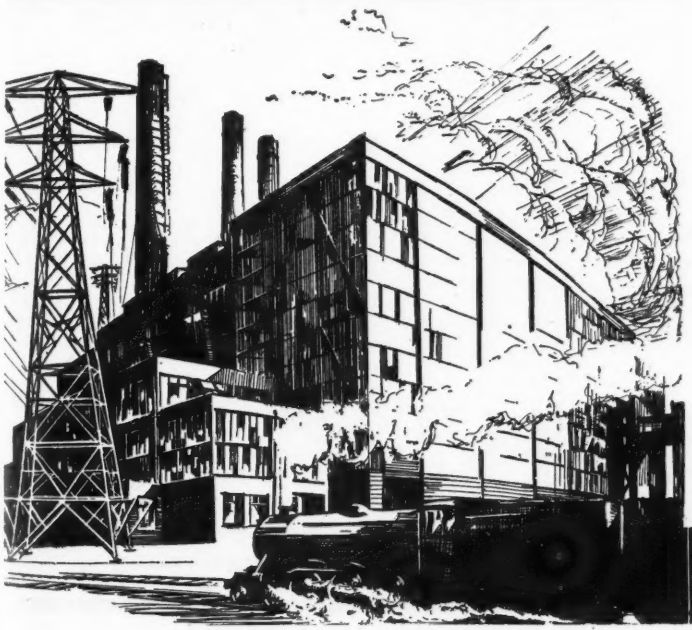

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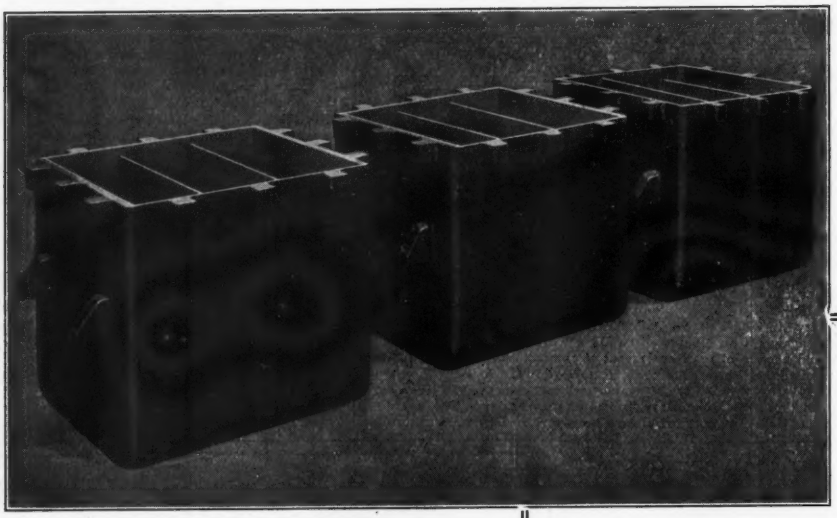

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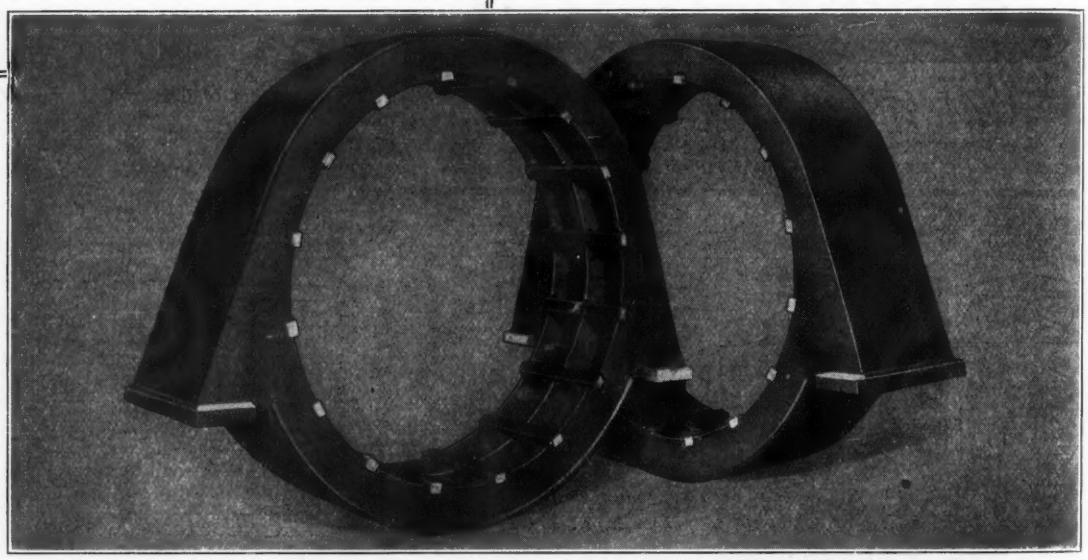

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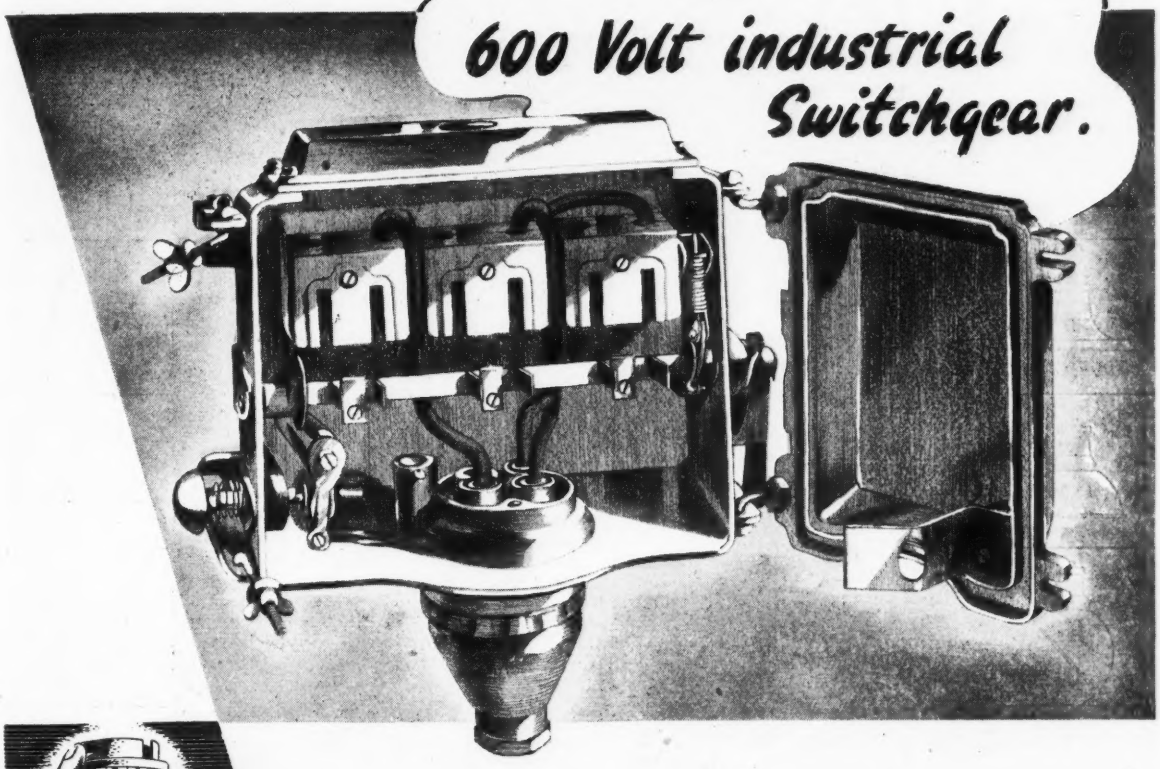

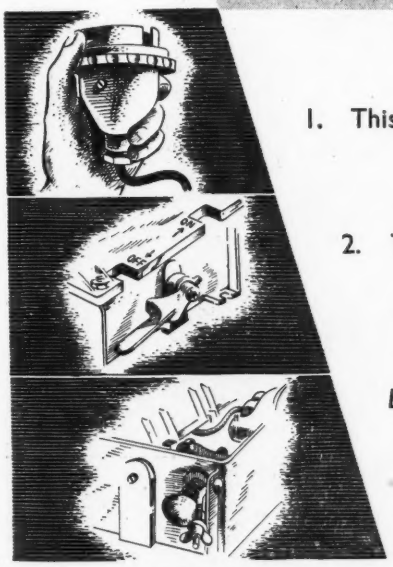

1. This cannot be inserted or removed while current is "On."

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   - *b.* Until cover is tightly fastened down.

BECAUSE :—This Controller cannot be pushed home and thus will not allow the Switch handle to come "ON" till "A" and "B" conditions have been complied with.

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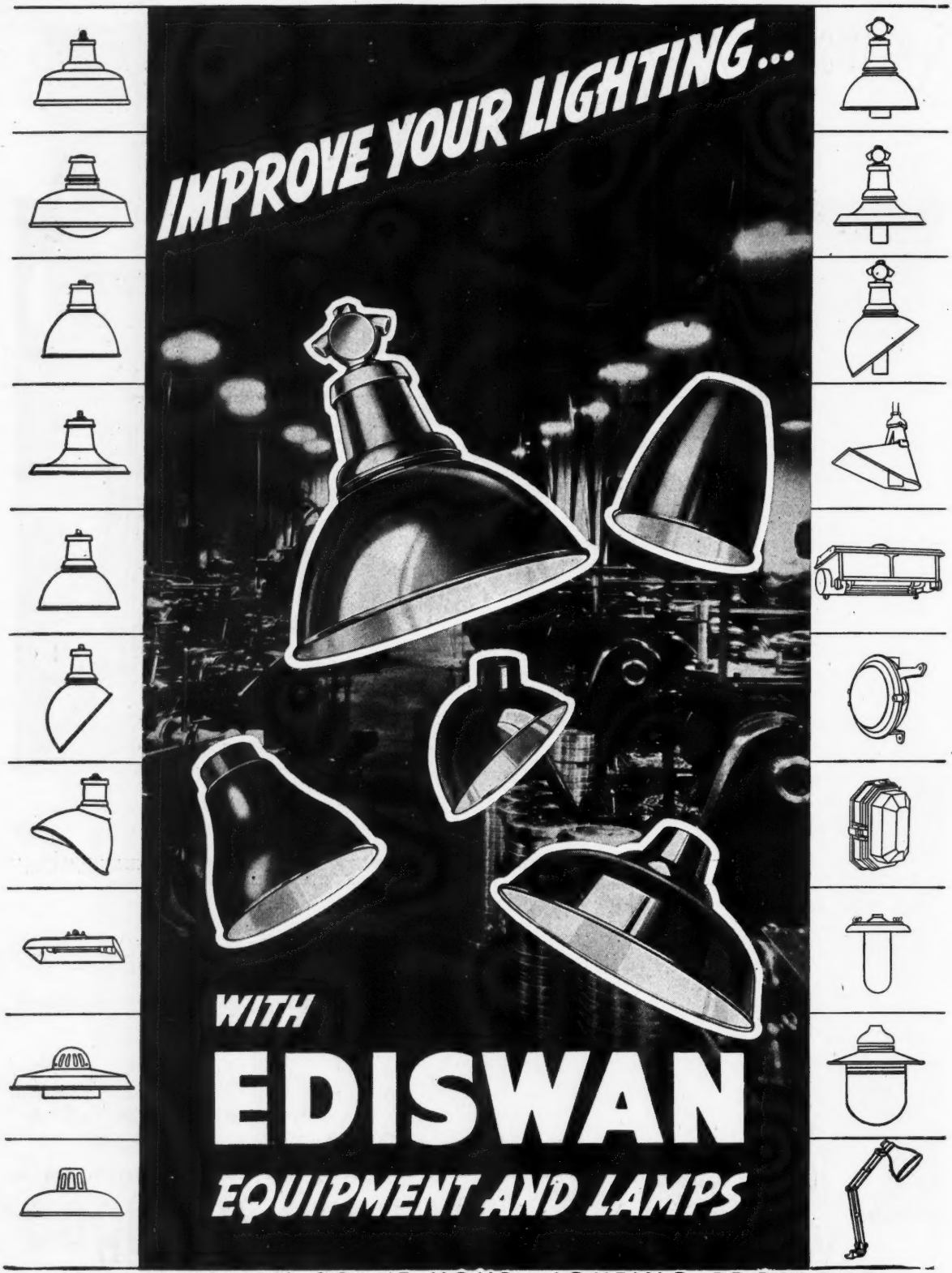

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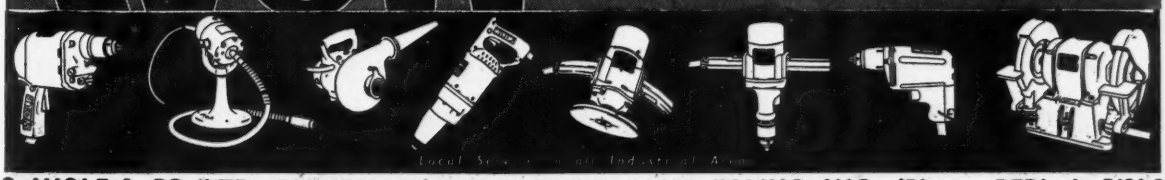

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All the light an outdoor worker needs to perform his duties during the Blackout, from a lamp that leaves both hands free. The Oldham "Touquette" lamp conforms to A.R.P. requirements (Specification A.R.P. 3). It is worn suspended from the shoulders and throws a diffused light permanently downwards to light the way, to make notes, count change, punch tickets, examine records, and perform the hundred and one operations undertaken by outdoor workers in every trade and industry. Thousands of Oldham "Touquette" lamps are in daily use.

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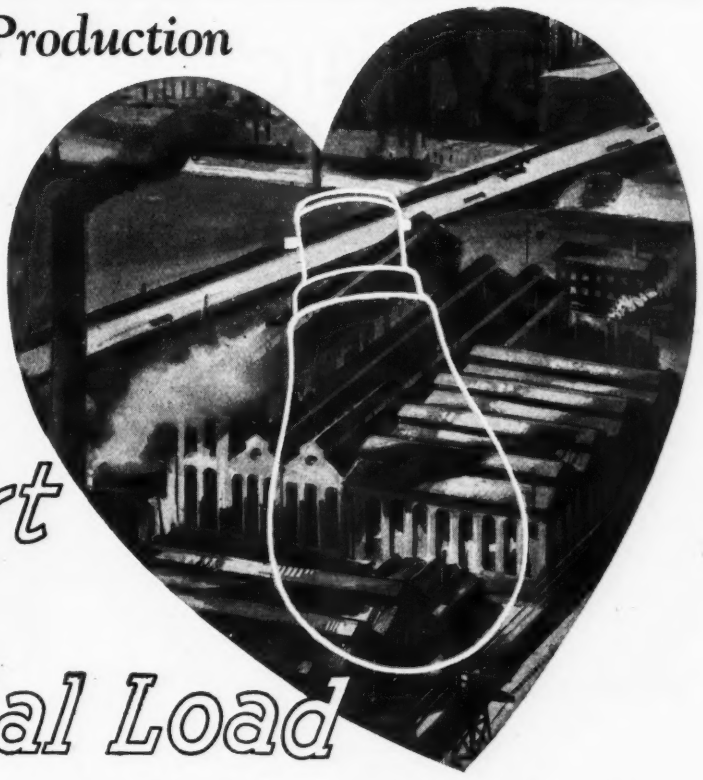

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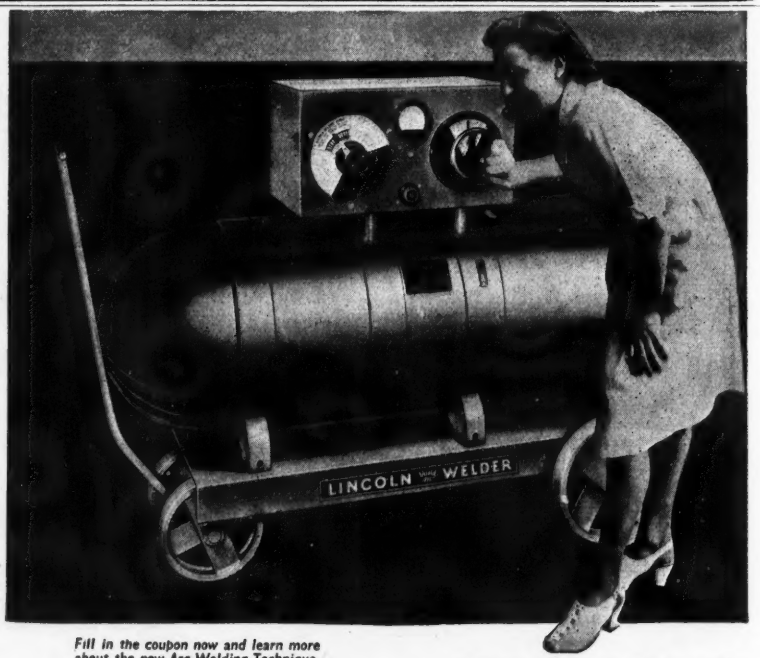

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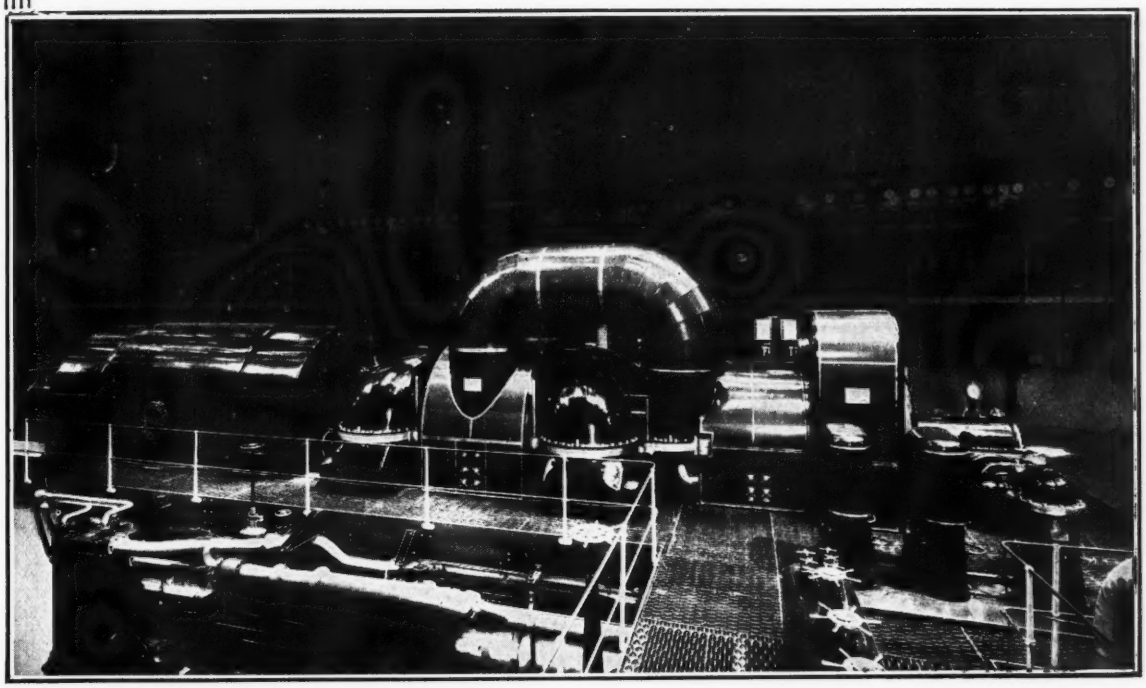

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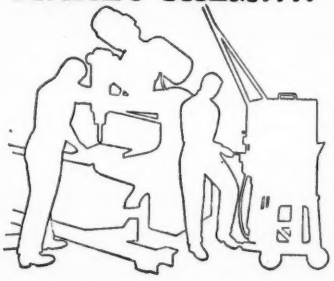

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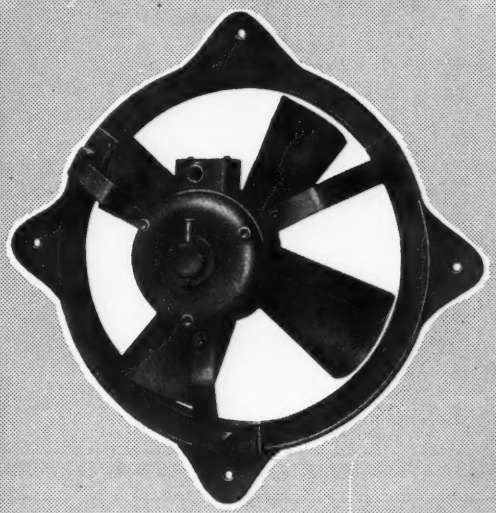

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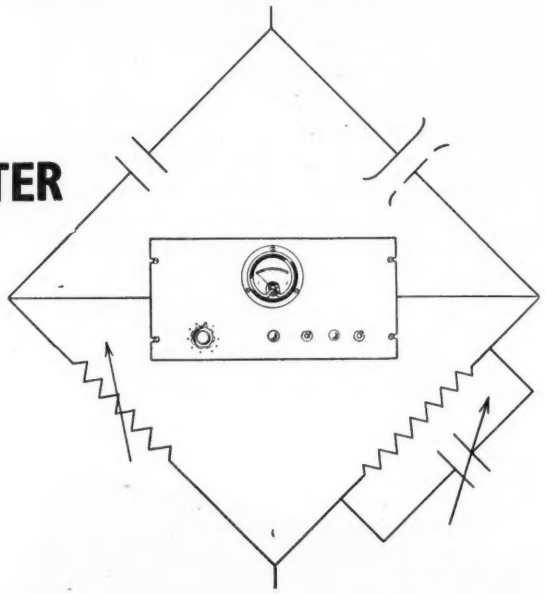

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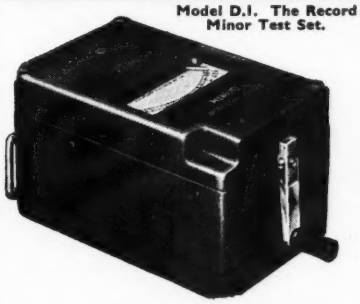
Model D.1. The Record Minor Test Set.



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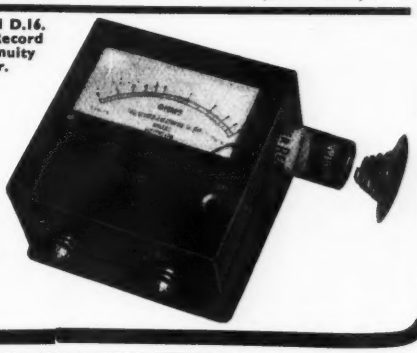

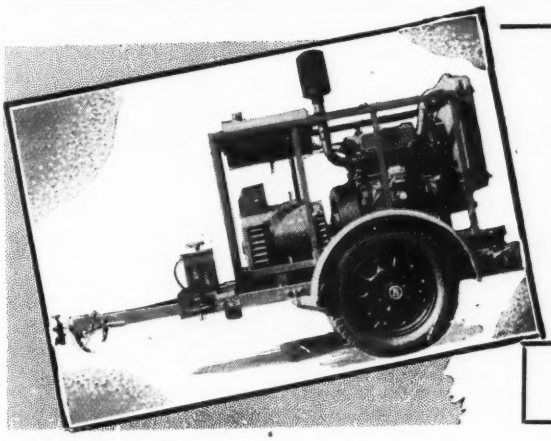

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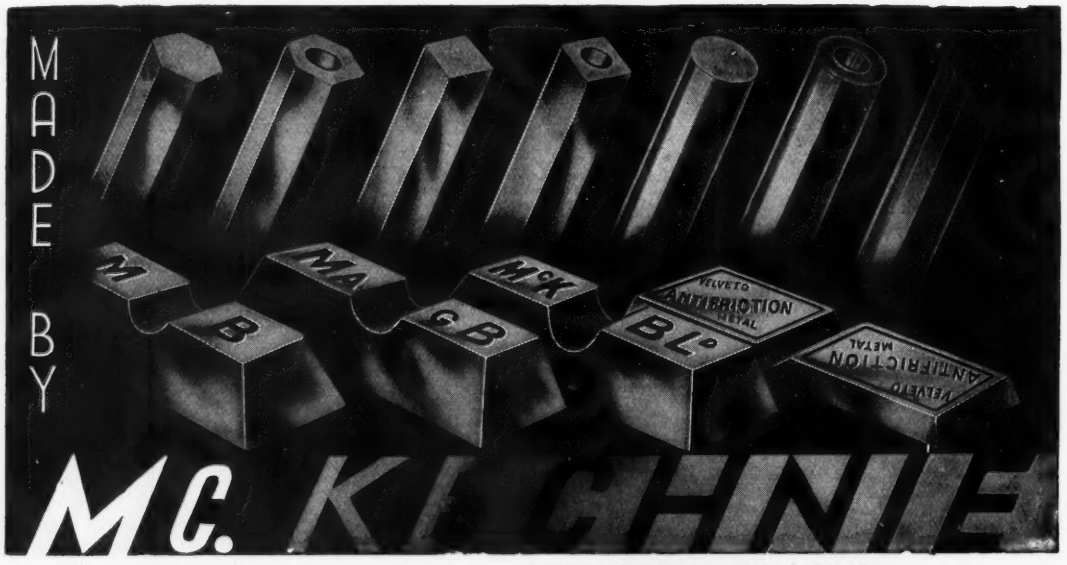
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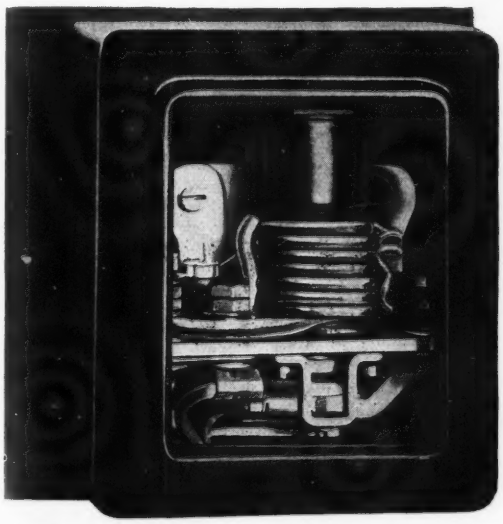
AUTOMATIC BATTERY CUT-OUTS



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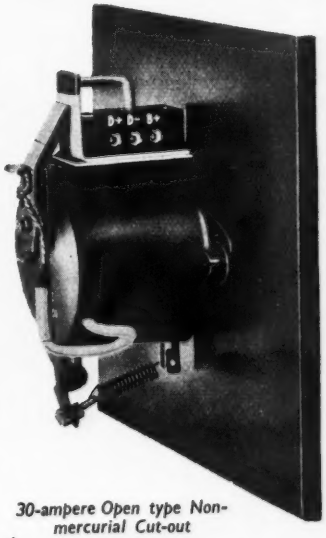

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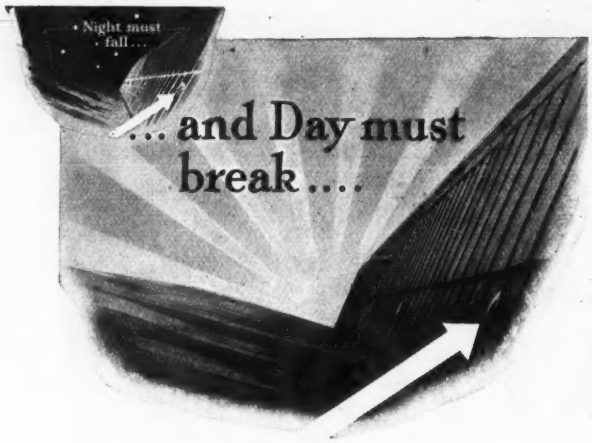

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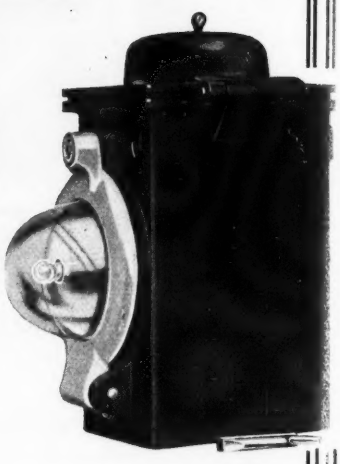

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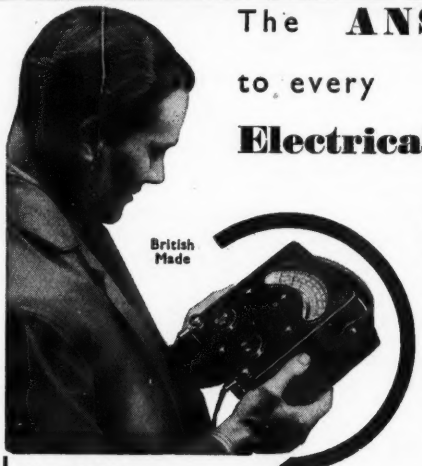

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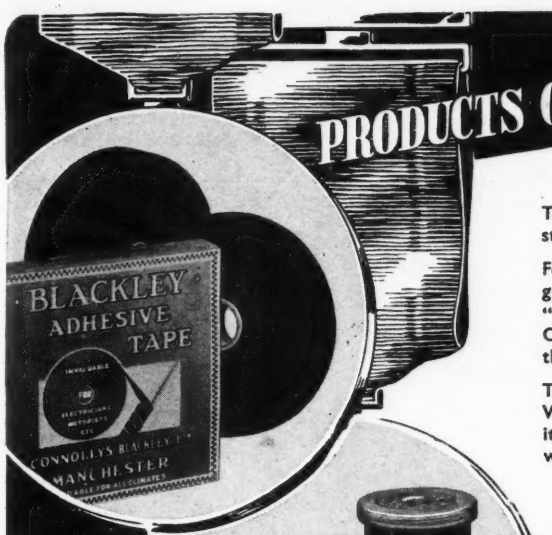

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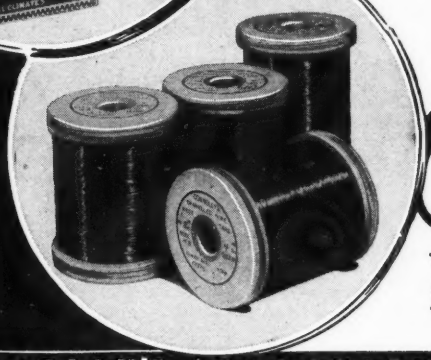

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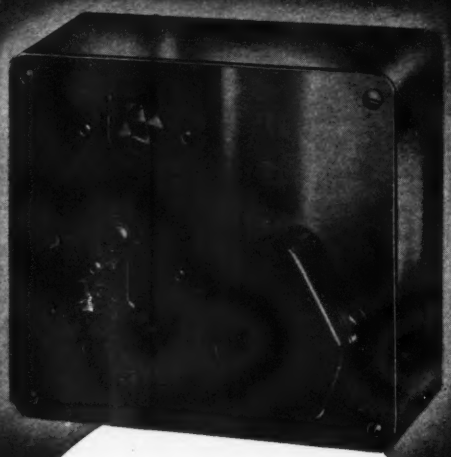

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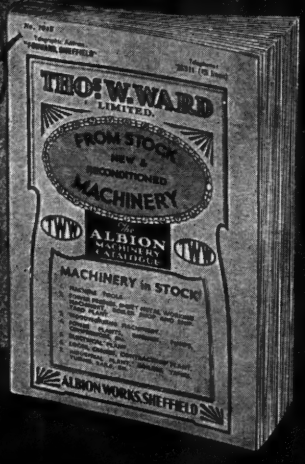

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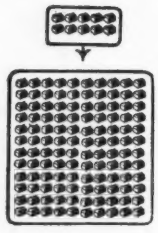

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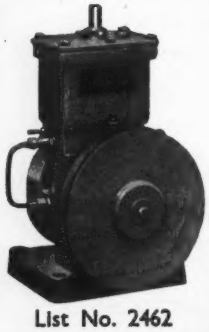

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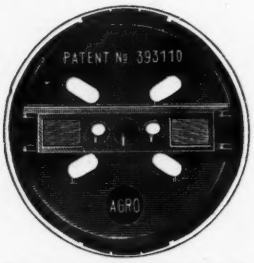

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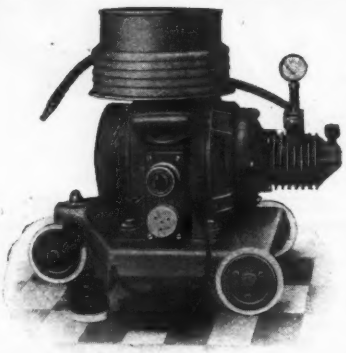

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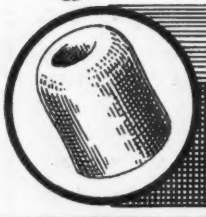

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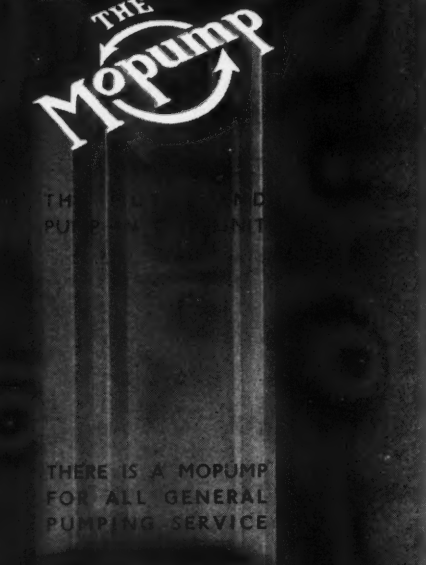

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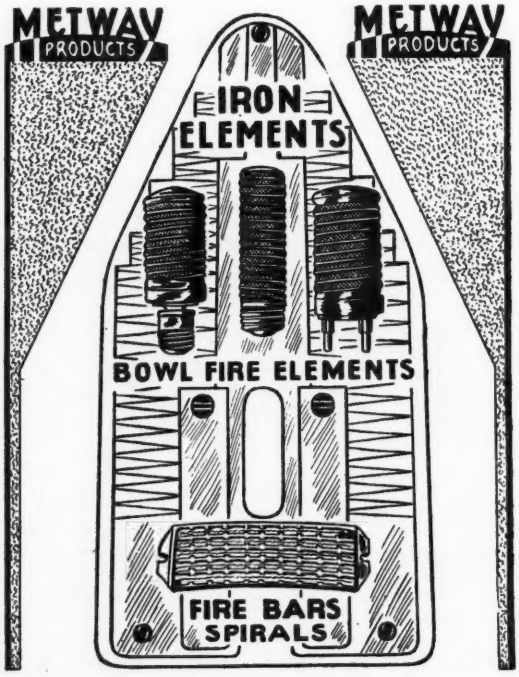

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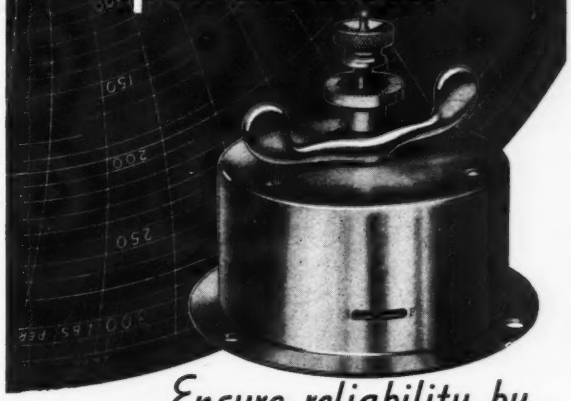

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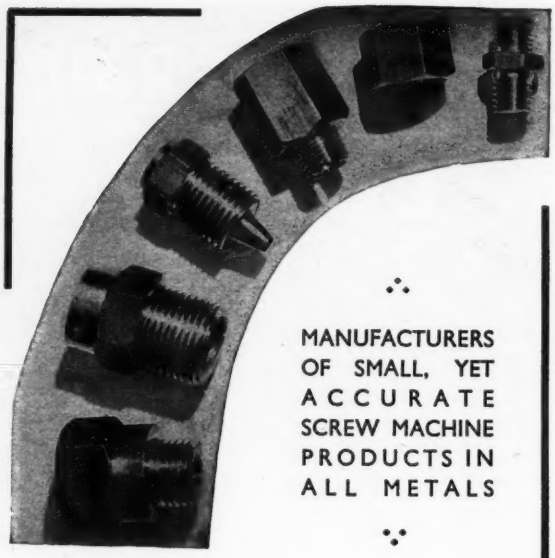

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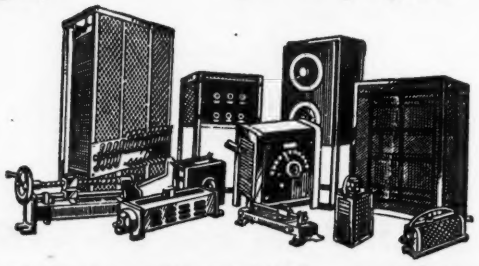

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FIG. 54-1
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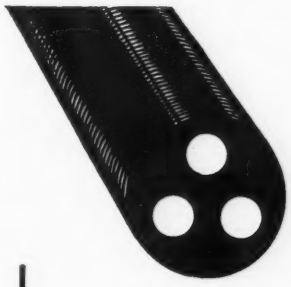

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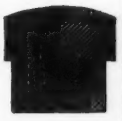

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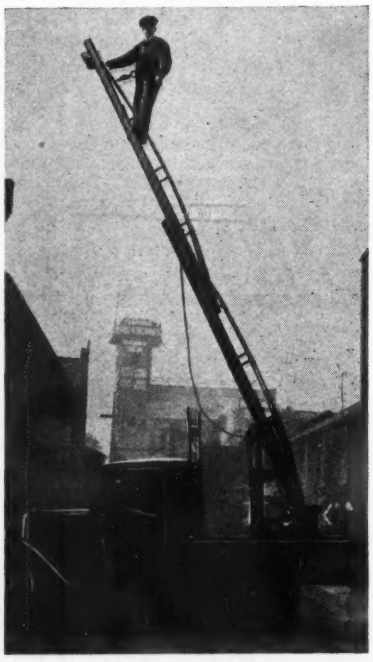

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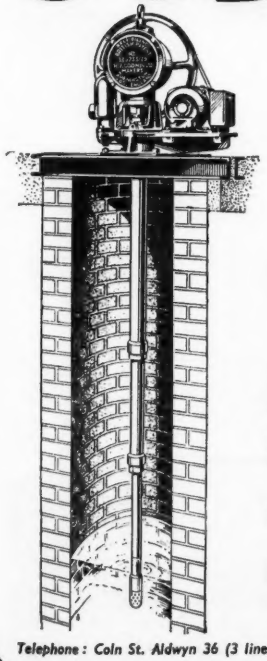

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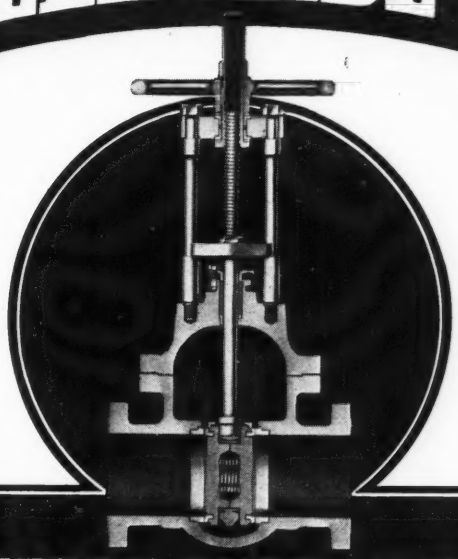

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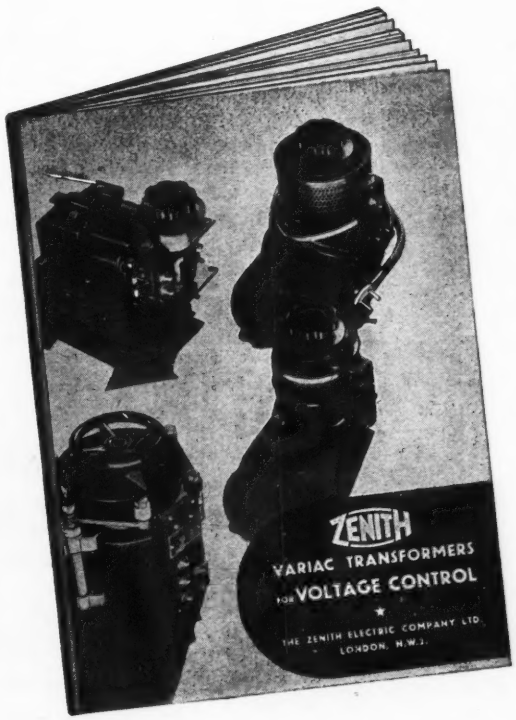

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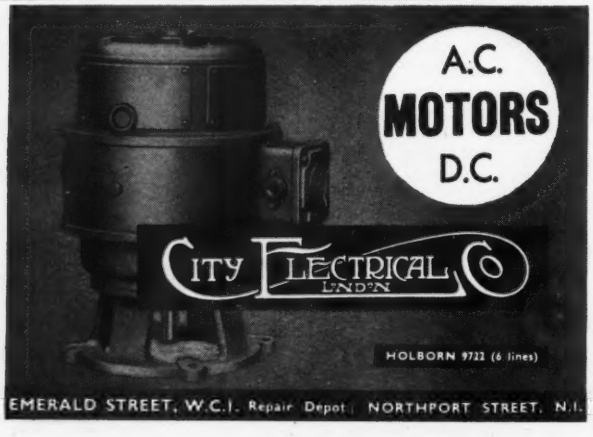

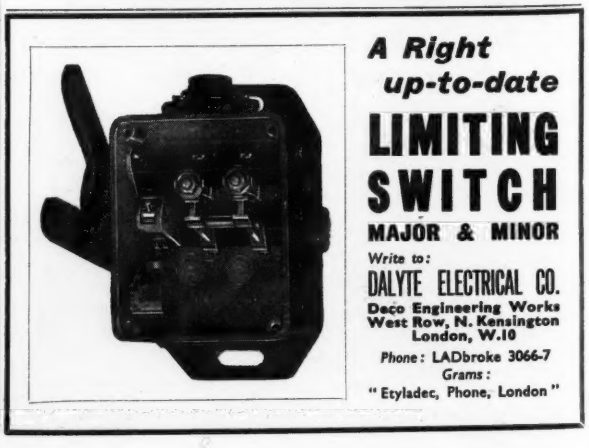

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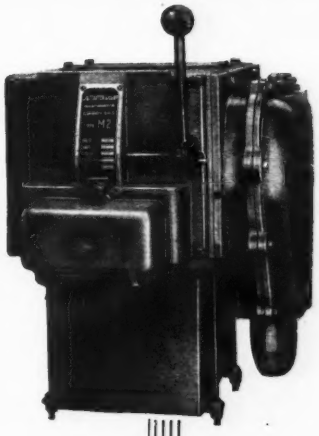

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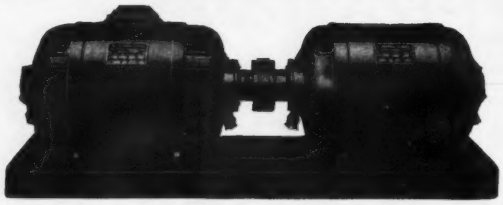

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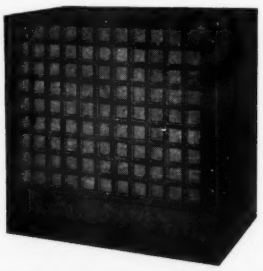

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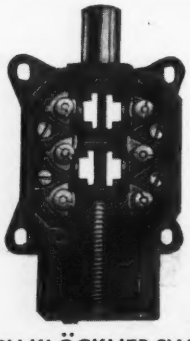

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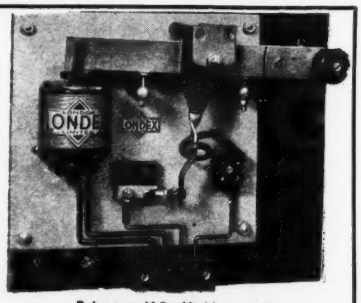

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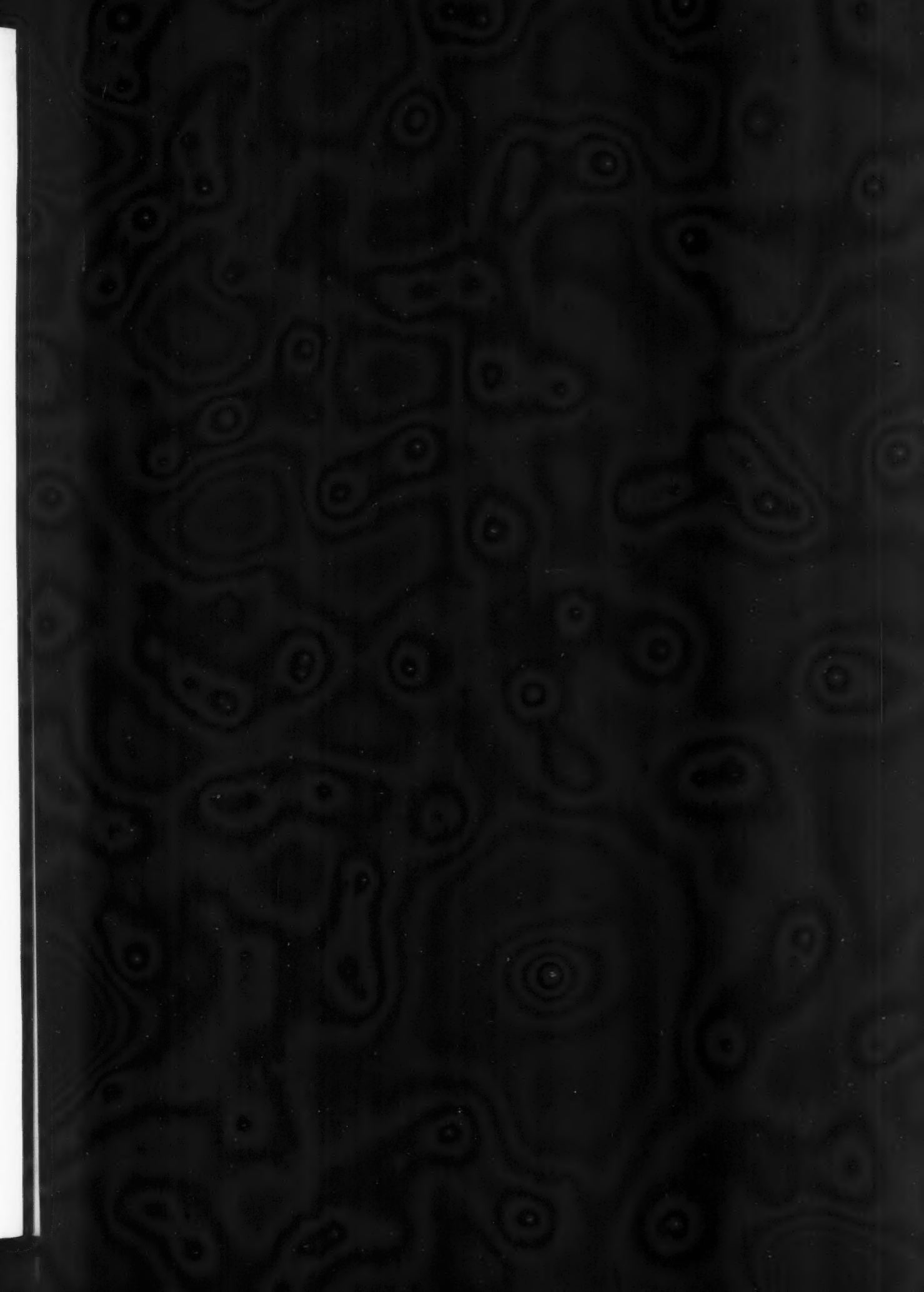

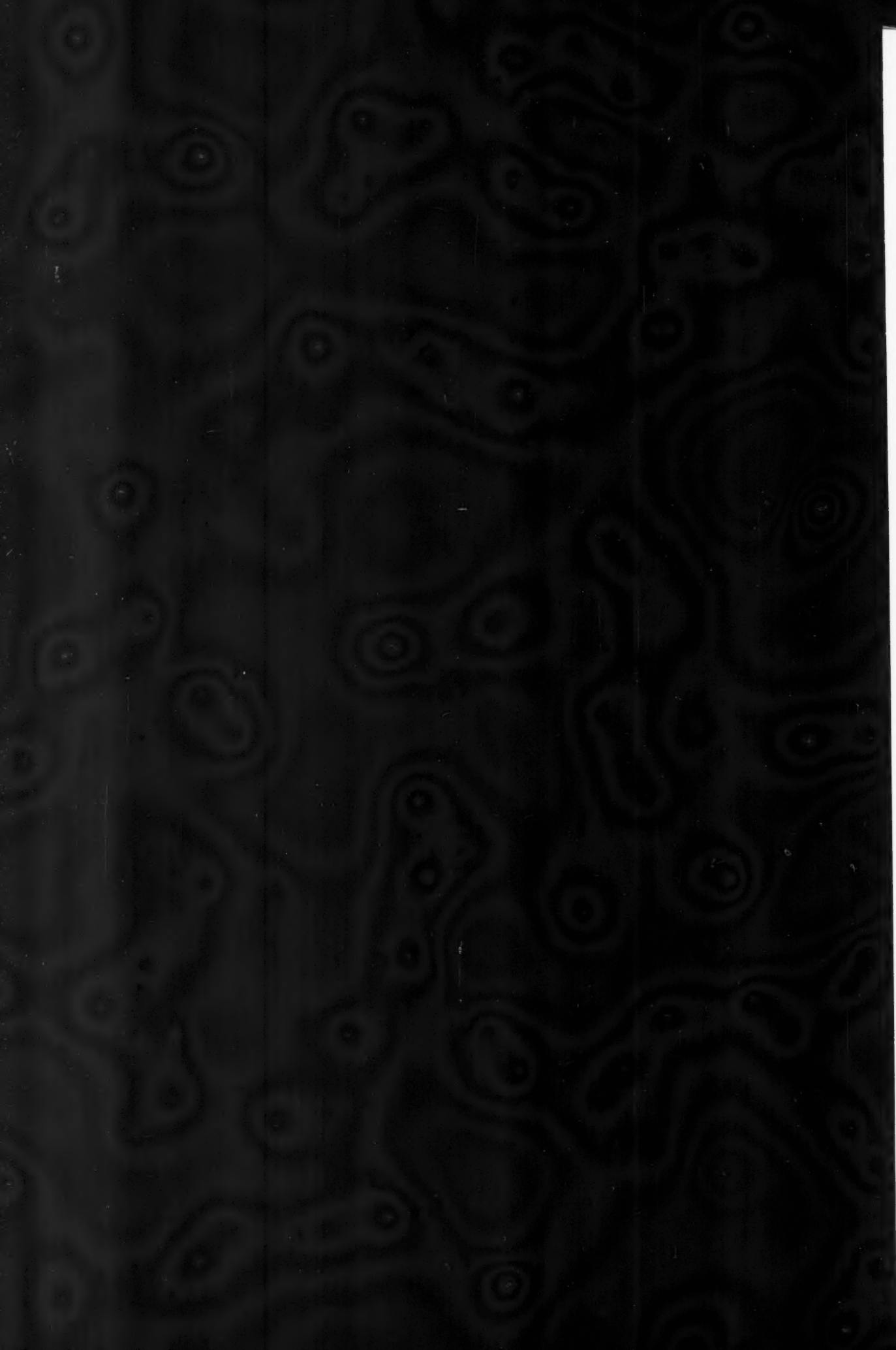

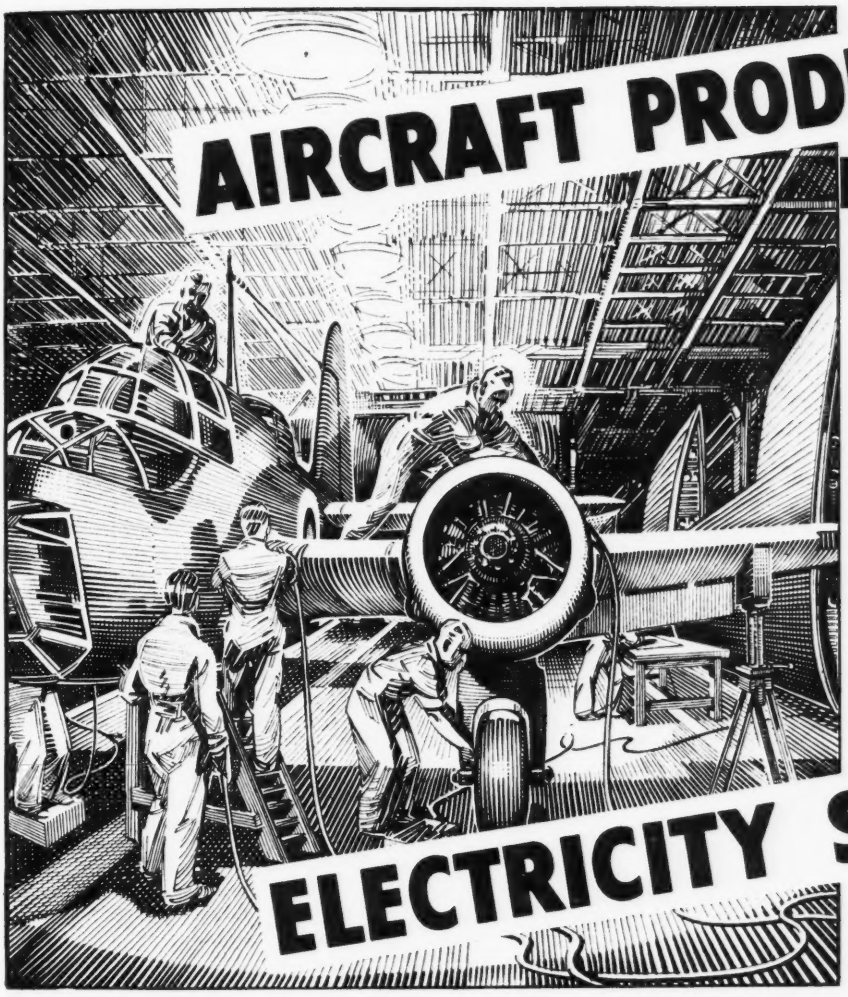

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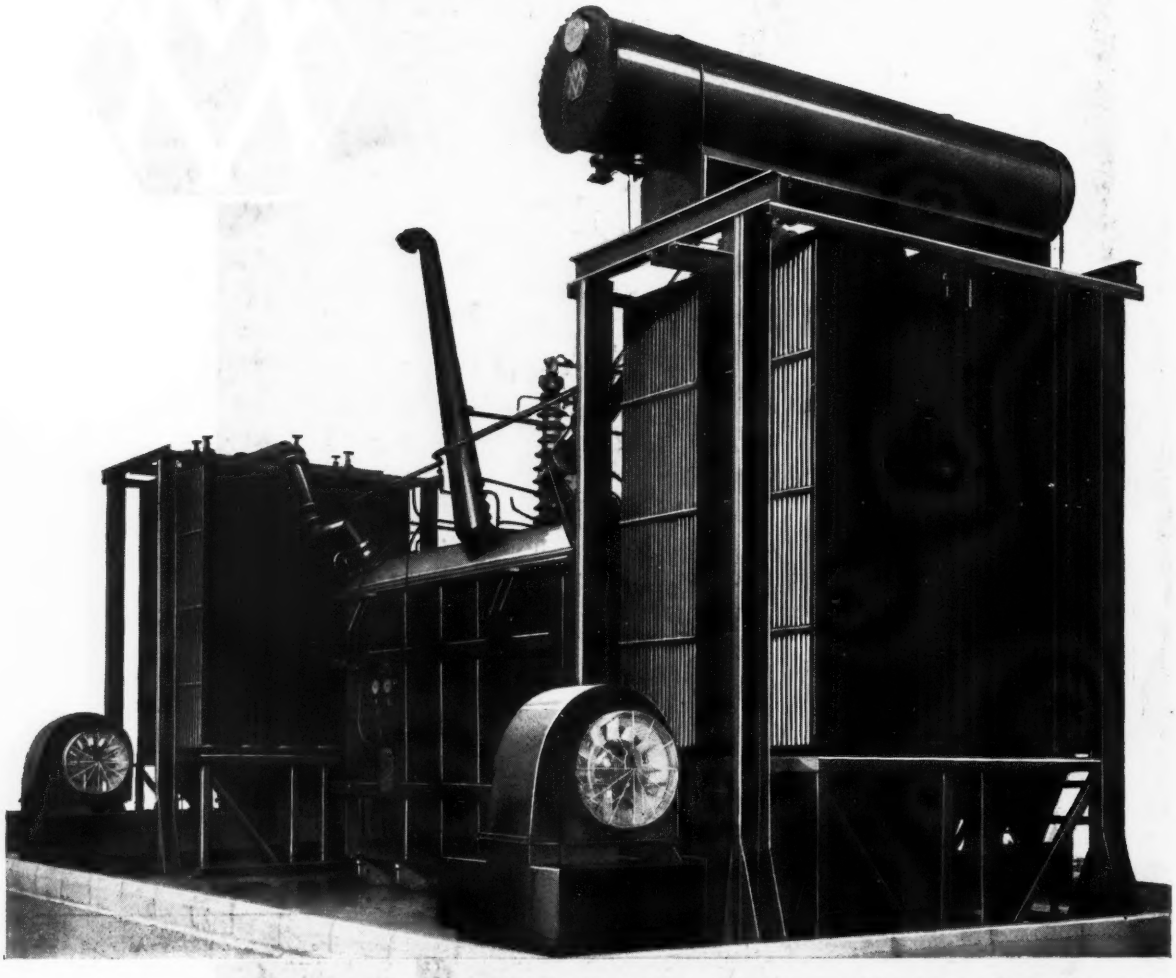

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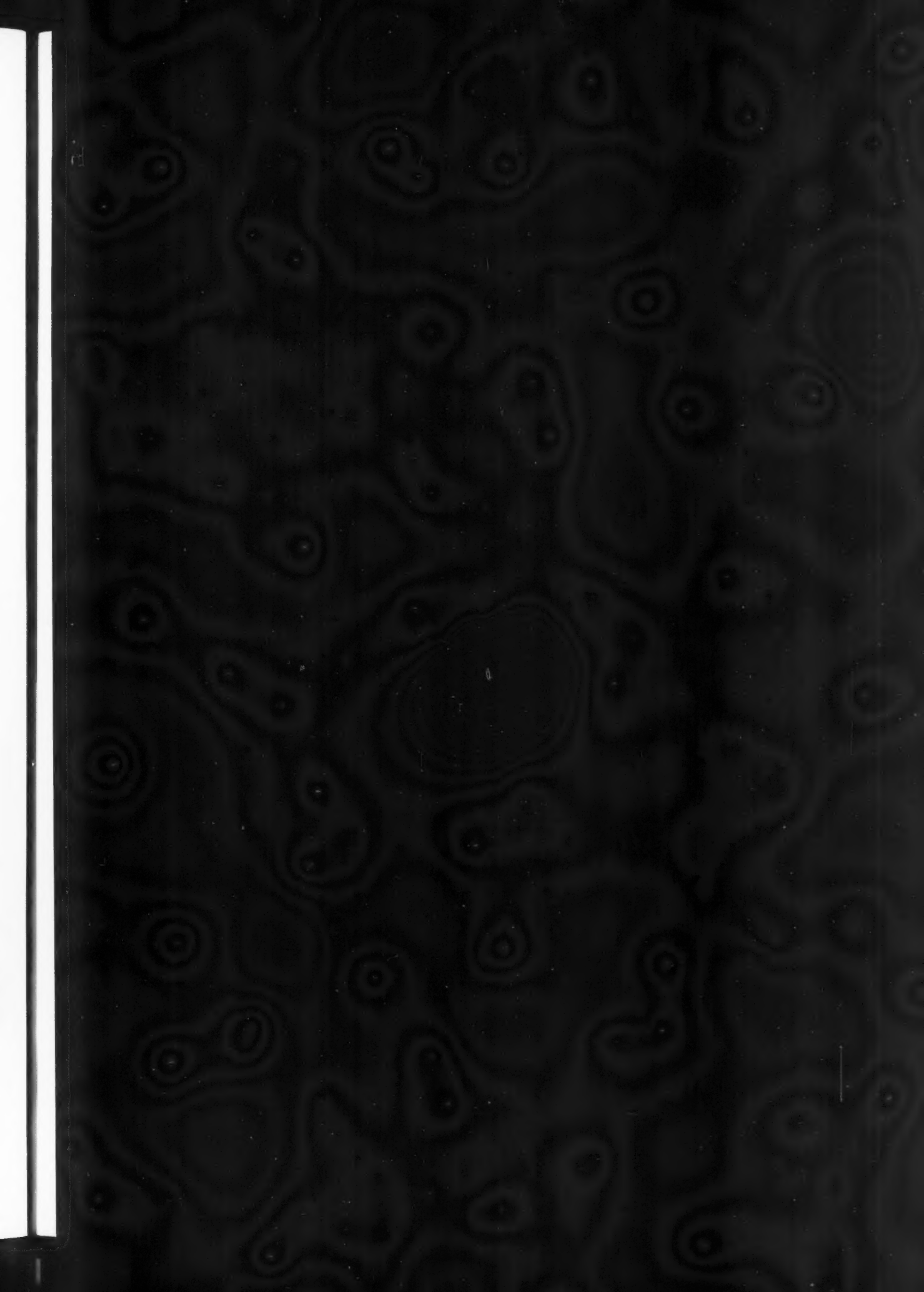
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